Planning for the Community & Rapid Transit

Impact Statement of ALRT along the East Lane of Commercial Drive — A Discussion Paper

August, 1983

CITY OF VANCOUVER
PLANNING DEPARTMENT

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This discussion paper, prepared by the Vancouver Planning Department, explores the implications of the proposed ALRT alignment in the lane east of Commercial Drive. This document has not been adopted by City Council as official policy. For City Policy guidance on this matter, please refer to the City Manager's report of August 5, 1983 titled ALRT in the Broadway Station Area: Impacts and Solutions.

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INTRODUCTION

Vancouver City Council has called for the construction of a cut-and-cover tunnel under Commercial Drive to deal with ALRT impacts on the adjacent neighbourhood. However, B.C. Transit (BCT), is in the process of implementing an elevated alignment along the lane east of Commercial Drive.

This report examines the impacts of the ALRT guideway on homes and businesses adjacent to the east lane of Commercial Drive and recommends methods to minimize those impacts should the east lane configuration proceed.

The report is divided into several sections. First, there is a general discussion of impacts and mitigation measures. Second, the context of the commercial and residential areas is outlined and the characteristics of the ALRT guideway and station are described. The impacts of the guideway are discussed and several methods to minimize these effects are suggested. Finally, several actions are recommended for different areas along the east lane alignment. This report only provides preliminary answers to the complex problem of integrating the ALRT guideway into the east lane of Commercial Drive. The plan for the Broadway Station Area will give further substance to these solutions when presented to Council for formal adoption.

IMPACTS AND MITIGATION MEASURES - A GENERAL DISCUSSION

Locating the ALRT alignment and a station in the Broadway area will have both positive and negative impacts. While it is important to stress the positive impacts such as increased accessibility, more shoppers for local businesses and, in some cases, higher property values, this report focusses on those impacts which require specific mitigation measures to minimize the negative effects of ALRT on the adjacent neighbourhood.

There are direct impacts which arise from the physical presence of the elevated guideway and the activity of a station in the Broadway area. These include:

- increased noise;
- loss of or disruption of some homes and businesses;
- shadowing and loss of privacy and views;
- loss of some on-site parking spaces and disruption of access to some businesses;
- potential "park-n-riders" on nearby streets;
- increased street congestion.

There are also indirect impacts that will result from the new ALRT station that will be more or less problematic according to how sensitively they are handled. These include:

- a changing community character;
- increased pressures for redevelopment;
- potential mismatch of growth and level of services;
- neighbourhood destabilization because of property speculation.

While mitigation measures can help moderate many ALRT impacts, they should not be seen as a panacea that will eliminate negative impacts altogether. Some impacts are simply not avoidable and represent a real cost in exchange for the benefits of ALRT. Examples of this include demolition of buildings and displacement of residents and businesses. The physical presence of the elevated guideway can not be completely screened and the new station will inevitably bring major changes to the area.

AREA CONTEXT

1 COMMERCIAL AREA

The retail area along Commercial Drive is centred at the Broadway intersection and is composed of pedestrian-related retail spaces at grade with, in some cases, office uses above. While many of the retail activities depend on local support, the presence of three medical buildings and one of the largest and newest Safeway stores in Vancouver draws a great many people from the larger community. The existing development pattern in the commercial area is shown in Figure 1.

Between the Grandview Cut and Broadway there are no prime developments fronting on Commercial Drive. There are two banks located here but they front on Broadway and have no entrances on Commercial Drive.

South of Broadway, commercial development with retail frontage and good quality office development is concentrated between Broadway and 12th Avenue. Most of the recent major developments have occurred on the east side of Commercial Drive between 10th and 12th Avenues. These include two three-storey medical/office buildings with retail uses at grade.

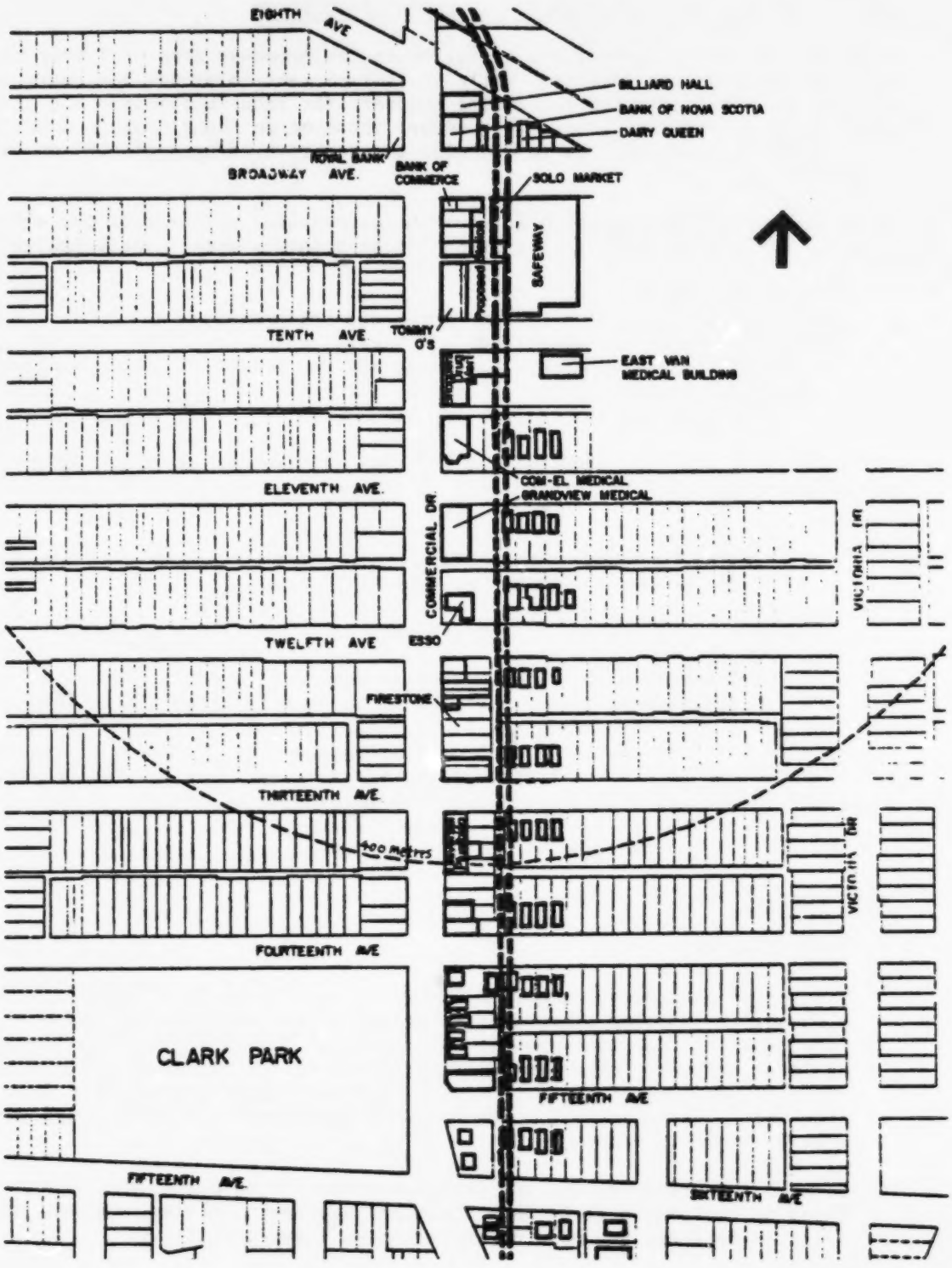


Fig. 1 BROADWAY COMMERCIAL AREA

The west side primarily consists of older one-storey retail/service outlets. These buildings have small store frontages and provide a continuous pedestrian-related retail area. All the uses in this area appear to benefit from on-street parking.

Retail uses along Commercial Drive have retained their pedestrian character despite the large volume of traffic carried on this arterial. Indeed, traffic and parking congestion reinforce Commercial Drive's role as more of a shopping street than a through traffic route. Storefronts tend to be small, with awnings, canopies or recessed entrances. The combination of small frontages, pedestrian weather protection and retail continuity create a viable, pedestrian-oriented shopping area.

The commercial development south of 12th Avenue has a different character. In this section there are no continuous retail frontages and the developments tend to be auto-oriented, particularly on the east side of Commercial Drive. Between 13th and 14th Avenues, the east side of Commercial Drive is occupied by a light industrial/wholesale outlet. Further south between 14th and 16th Avenues there are residential uses on either side of Commercial Drive.

There is some significant commercial development that is not located on Commercial Drive. The Safeway store is located on the south side of Broadway, east of Commercial Drive. There are other commercially zoned sites along Broadway to the east and west of Commercial Drive that could benefit from the increased development potential created by proximity to the station. Many contain one-storey buildings which could be redeveloped. The five-storey East Van Medical Building is located on the south side of 10th Avenue, east of Commercial Drive.

Commercial sites along Commercial Drive and Broadway are zoned C-2. This allows retail, service and office uses on all floors and residential on upper floors only. Existing zoning discourages residential use by restricting floor space for residential to less than the floor space allowed for retail and office uses. Technically, C-2 zoning allows a floor space ratio (FSR) of 3.0 but the 12.2 metre (40') maximum height limit and parking requirements effectively restrict the potential FSR to just over 1.5. Table 1 shows the FSR and heights of the most prominent buildings surrounding the Broadway Station.

TABLE 1

Floor Space Ratios and Heights of Prominent Buildings Near Broadway/Commercial Intersection

Building	Address	FSR	Height
Com E1	2606 Commercial	1.56	3 storeys
Grandview Medical	2620 Commercial	1.61	3 storeys
East Van Medical	1750 East 10th	0.99	5 storeys 22.2M (73')

II RESIDENTIAL AREA

The RT-2 zoned residential neighbourhood between Broadway and 16th Avenue east of Commercial Drive can be divided into three sub-areas:

A. north of 12th Avenue
B. south of 12th Avenue east of the lane
C. south of 12th Avenue west of the lane

A. North of 12th Avenue

North of 12th Avenue there is no existing east lane paralleling Commercial Drive. Commercial properties obtain access from residential streets, and from Commercial Drive via east/west lanes. The three medical buildings and large Safeway store generate significant traffic and create an on-street parking problem on 10th and 11th Avenues.

On 10th Avenue, the Safeway parking lot extends almost to Victoria Drive and the East Van Medical building takes 23 metres (75') of frontage on the south side. Aside from a three storey walkup apartment on the southwest corner of Victoria Drive and 10th Avenue there are only nine converted single family homes in this block, four of which are absentee owned. Dwellings are in generally good condition.

11th Avenue is composed of older converted single family homes, almost 70% of which are owner occupied. Houses are on narrow 10 metre (33') wide lots and generally consist of either one or two dwelling units (duplex units predominate on the north side). Dwellings are mixed in condition, ranging from fair to good.

In 1974, a major redevelopment was proposed for a six lot RT-2 zoned parcel on the north side of 11th Avenue. The proposal consisted of a terraced seven storey structure (see Figure 2) with forty-eight dwelling units plus a daycare and health centre. The application to rezone the property to CD-1 was refused due to the underutilized potential of other multi-family and commercial sites in the adjacent area. However, the Technical Planning Board indicated that favourable consideration could be given to townhouse development in this RT-2 District.

Residences fronting on 12th Avenue face a busy arterial street. Although not a truck route, 12th Avenue has a week-day traffic flow of 26,700 vehicles/day, creating noise impacts for adjacent residents. Perhaps for this reason, absentee ownership is highest here (41%) and there is more multi-family housing on this street.

Experience from other North American cities indicates that virtually all transit related development occurs within 400 metres of a station. Therefore, there is more potential for change in the adjacent residential area north of 12th Avenue than south of 12th Avenue which is further away from the Broadway station.

Fig. 2 REZONING PROPOSAL (1974) 1700 EAST 11 TH AVENUE

B. South of 12th Avenue East of Lane

A continuous lane parallels Commercial Drive from 12th to 16th Avenues. The east side of the lane is residential in character and the homes are similar to those on 11th Avenue. 78% of the homes are owner occupied (not including 12th Avenue).

Evidence of improvements through the Neighbourhood Improvement Program is apparent. New pavement, sidewalks and curbing have been installed on 14th and 15th Avenues and trees have been planted in the boulevard. Given the distance from the station, it is less likely that change will take place in the area.

C. South of 12th Avenue West of Lane

The problem of the ALRT guideway's impacts on residences east of the lane is well recognized, but little attention has been given to impacts on residential property west of the lane. While sixteen residential units (ten buildings) east of the lane will flank the guideway, sixteen other residential units (eight buildings) on the west side back onto the ALRT guideway (see Figure 1). Thus, the potential impacts of ALRT are as severe west of the lane as east of the lane.

The units on the west side of the lane consist of older three storey walkups and some single family homes in fair condition. Zoning is C-2 north of 15th Avenue although the vacant alternative school on 15th Avenue and Commercial Drive was marketed as a MURB site, without success. Zoning south of 15th Avenue is RT-2. Redevelopment potential in the C-2 zoned area will be greater than east of the lane because of the broader range of uses allowed in commercial areas.

ALRT ALIGNMENT AND GUIDEWAY PROFILE

BCT plans to put the guideway over the Clark Drive bridge, and the guideway will remain elevated on the south side of Grandview Highway, pass over Commercial Drive north of the railway cut, and it will enter the east lane as shown in Figure 1. Two separate guideways are proposed from the railway cut to just south of 11th Avenue to accommodate a centre-loaded station platform adjacent to Safeway's new store. The guideway will emerge from the lane south of 16th Avenue and continue along the northwest edge of the Croatian Cultural Centre property and into the B.C. Hydro and Power Authority right-of-way via the Victoria Diversion.

The guideway will generally be in a form similar to Figure 3. The overall width at the top of the rail is approximately 6.5 metres (21'). BCT plans to place the western edge of the guideway support column 1 metre (3') from the east boundary of the lane or the adjacent commercial property line where no lane exists (see Figure 3). This will result in a 2 metre (6') overhang into the lane and a 4.5 metre (15') overhang into the property immediately east of the guideway. The height of the guideway will vary from 7 metres (23') at Broadway and at 12th Avenue to 8 metres (26') at 14th Avenue as noted on the following Table 2.

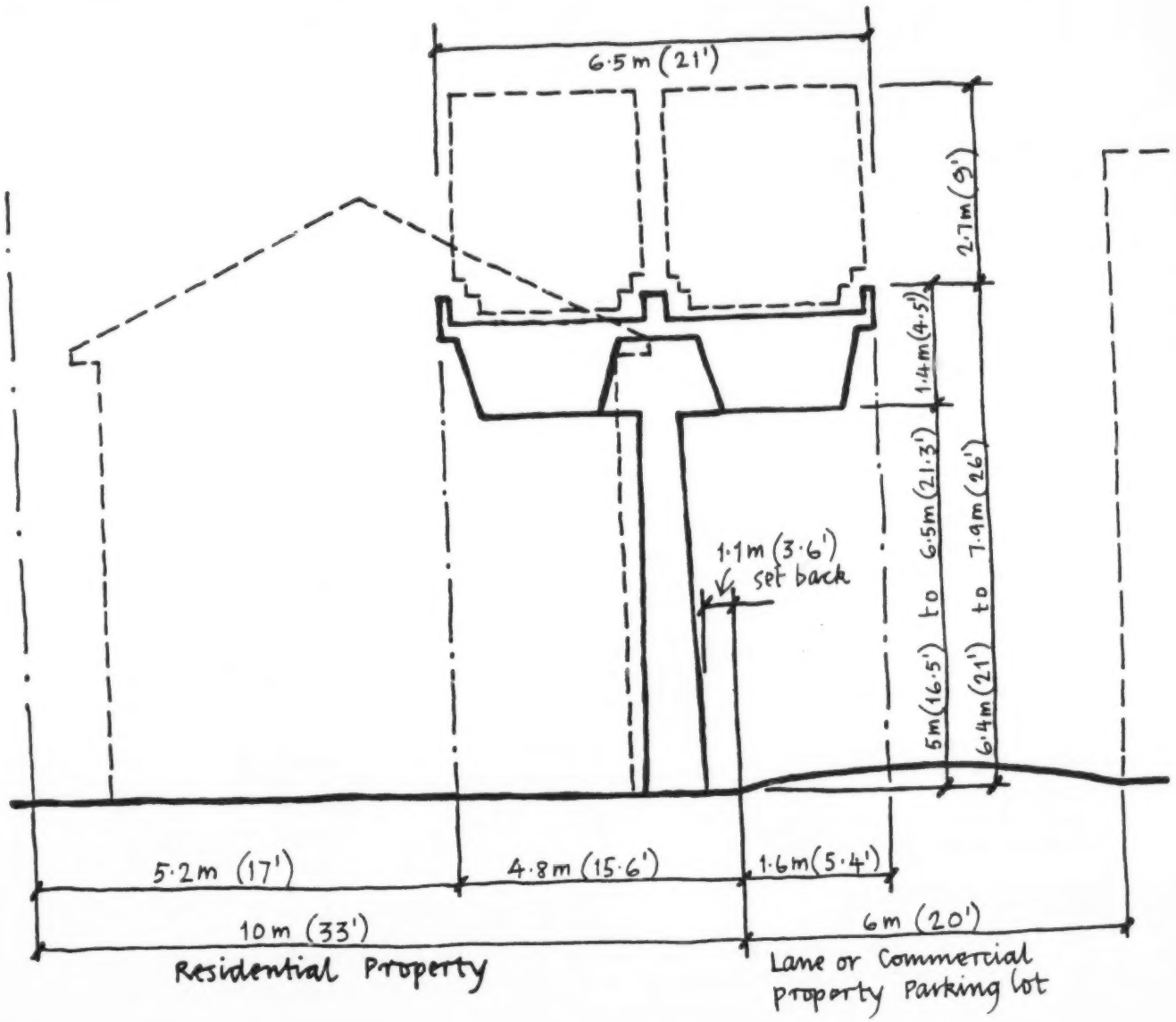


Fig. 3 TYPICAL GUIDEWAY SECTION

TABLE 2

ALRT Heights in East Lane of Commercial Drive

Location	Height from Pavement to Top of Rail	
Broadway	6.9m	(22.6')
10th Avenue	7.3m	(24')
11th Avenue	7.9m	(26')
12th Avenue	6.9m	(22.6')
13th Avenue	7.4m	(24.2')
14th Avenue	7.9m	(26')
15th Avenue	7.1m	(23.2')
16th Avenue	7.5m	(24.6')

STATION LOCATION AND DESIGN

A site plan and section of the proposed Broadway station are shown in Figures 4 and 5. The elevated 80 metre (262.5') long station platform is located between Broadway and 10th Avenue, less than 1 metre (3') west of the Safeway building. The platform and guideway consume approximately 16 metres (52.5') of property west of Safeway's west wall. There is limited development potential underneath the platform as grade level space here is used for stairs and escalators, a ticketing area and maintenance and systems rooms.

The current functional plans indicate that the only pedestrian entrance on the south side of Broadway will be located directly underneath the platform on Broadway, which is oriented away from the pedestrian related retail activity centred on Commercial Drive. City staff have expressed the importance of a direct pedestrian connection between the ALRT station and the Commercial Drive shopping area. It is recommended that BCT provide a second station entrance on 10th Avenue or on Commercial Drive. If this is not possible, future provision for such an entrance should be made.

A possible pedestrian overpass is shown crossing Broadway, providing direct access to the station from the north side of the street. This overpass may only be provided as part of a major redevelopment of that parcel. It is estimated that 4,000 people will be entering or leaving the station in the A.M. peak. Many of these people will be crossing Broadway to transfer to buses bound for Central Broadway. The pedestrian overpass would help prevent additional congestion at the Broadway/Commercial intersection and should be provided as part of the initial system's facilities and not be contingent on subsequent redevelopment of the site.

BUS LOOP ALTERNATIVES

One off-street bus loop layout has been proposed by B.C. Transit and would be located on the northeast quadrant of the intersection as illustrated in Figure 6.

The bus loop is irregular in shape and divides the triangle of properties created by Commercial Drive, Broadway and the Grandview cut into two separate parcels. 336 square metres (3616 square feet) are required for the proposed bus loop, of which 72 square metres (775 square feet) are underneath the guideway. The bus loop will be eight metres (26.3') wide except for the section paralleling Broadway which is 10 metres (32.8') wide.

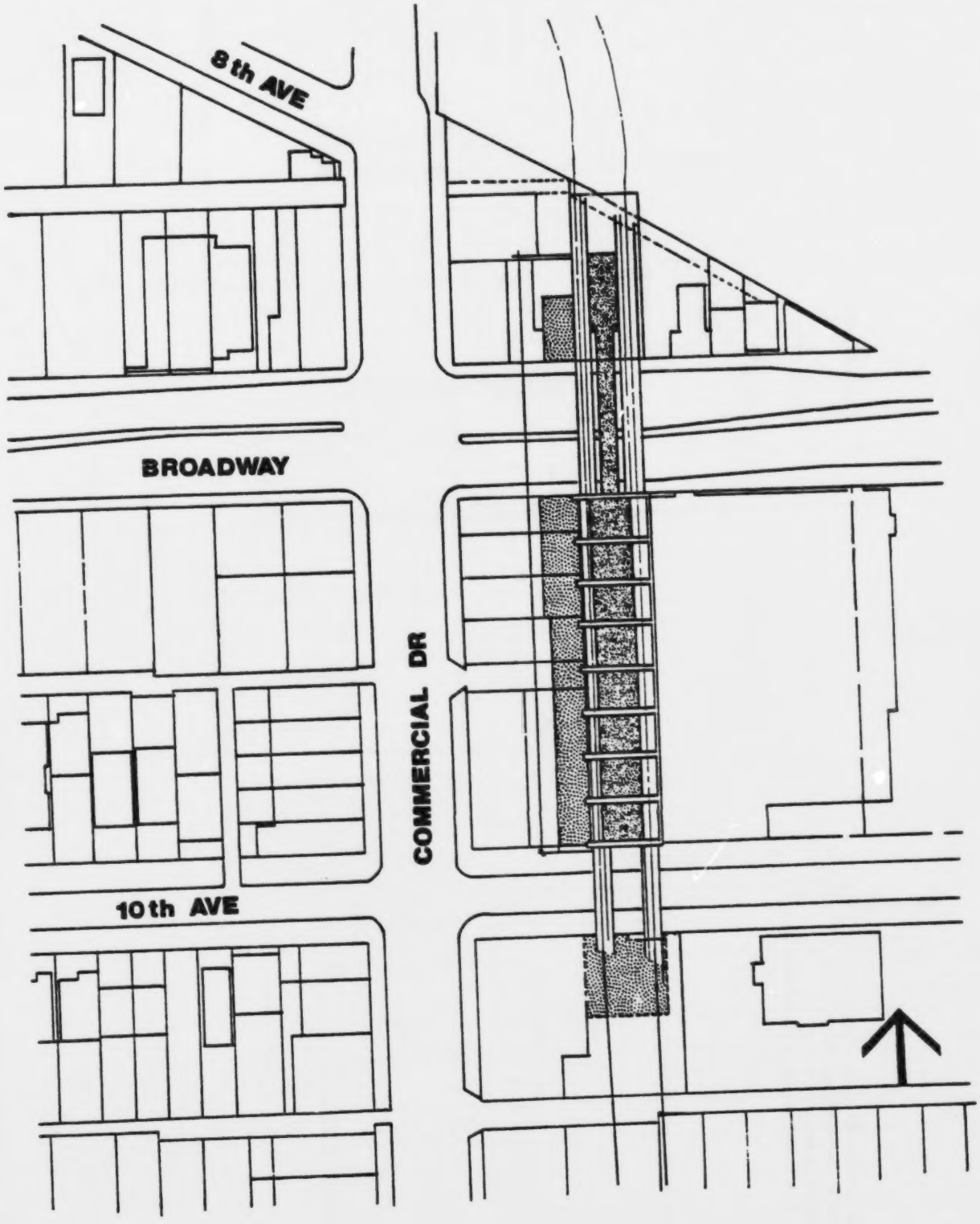


Fig. 4 BROADWAY STATION SITE PLAN AS PROPOSED BY B.C. TRANSIT

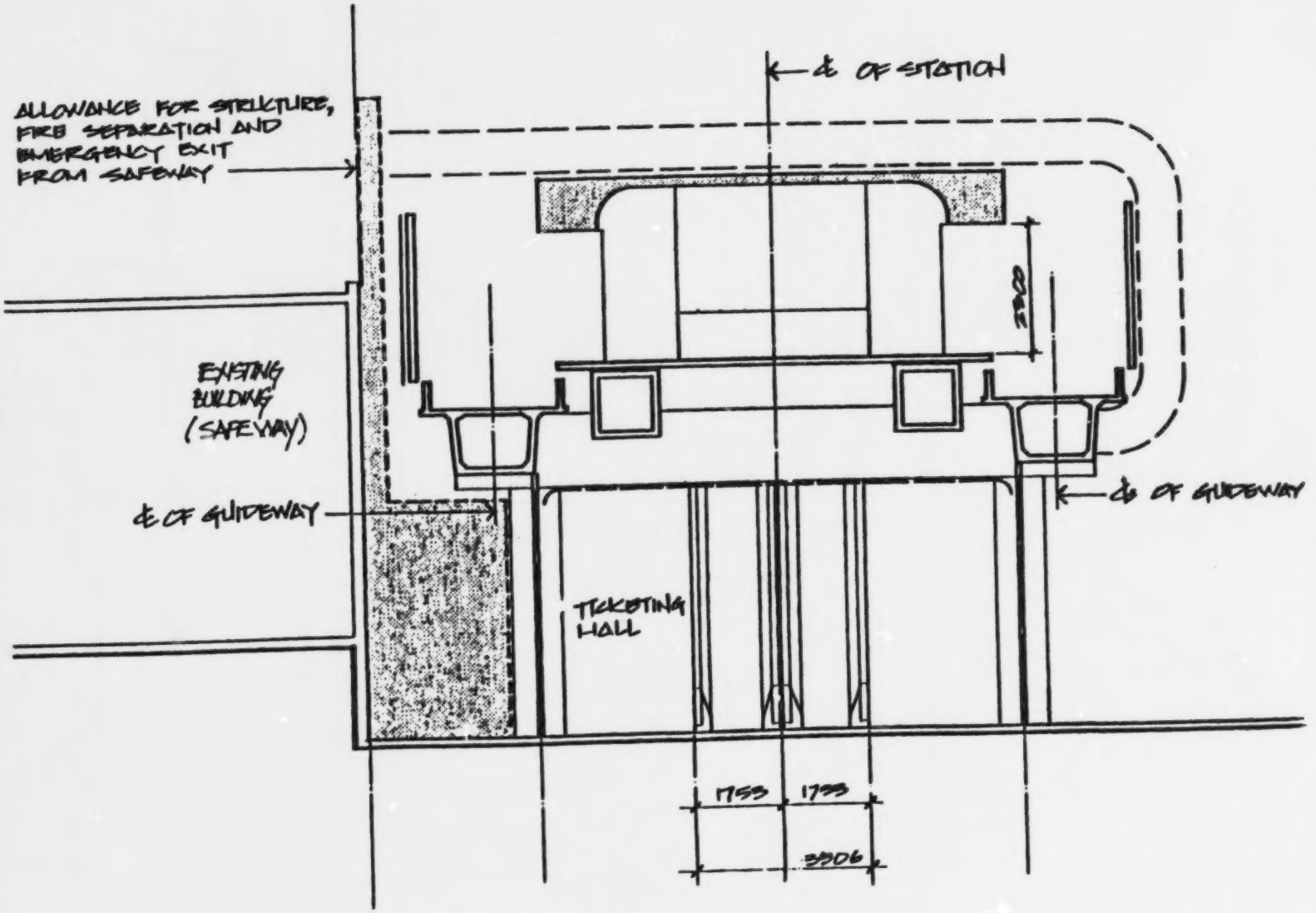


Fig. 5 BROADWAY STATION SECTION AS PROPOSED BY B.C. TRANSIT

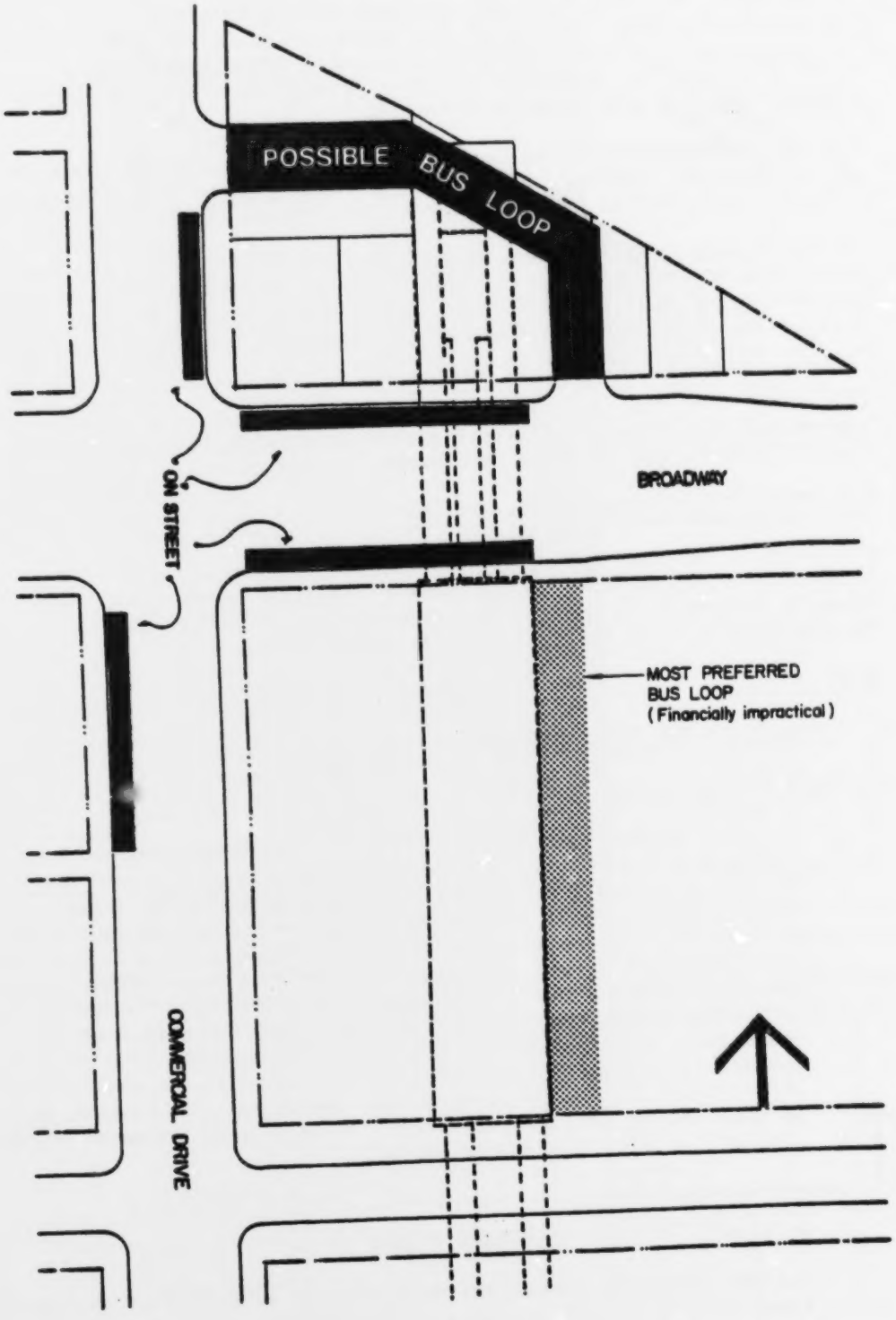


Fig. 6 BROADWAY STATION POSSIBLE BUS LOOP AS PROPOSED BY B.C. TRANSIT

Two on-street bus loop options have been proposed for the Broadway Station in the event that the northeast bus loop is not feasible or cannot be implemented by 1986. One on-street option makes use of the existing bus turnaround on 10th Avenue between Commercial Drive and Victoria Drive. The other on-street configuration would be located on Grandview Highway between Commercial Drive and Victoria Drive.

The most preferred bus loop option would have been located along the east side of the station. However, as this would involve demolition of a portion of the Safeway Store, it has not been pursued because of the high costs involved.

It is projected that bus volumes will increase between 33% and 50% in the peak hour (from 60 now to between 80 and 90 buses in 1986 and beyond) when ALRT becomes operational. Most of the increased bus volumes will be between Broadway Station and the Central Broadway area. There will be little change in bus volumes in the off-peak hours.

City staff feel that an off-street bus loop is preferable to an on-street bus loop due to the already congested arterials around the station. Bus loop design, however, should not rule out development of the northeast triangle site.

B.C. TRANSIT LAND ACQUISITION PATTERN

B.C. Transit has confirmed that the location of the station in the east lane of Commercial Drive requires purchase of adjacent commercial properties as shown in Figure 7. B.C. Transit has proposed a two-lot acquisition pattern in the residential area further south as shown in Figure 8.

ALRT IMPACTS

1. IMPACTS IN THE COMMERCIAL AREA

A. Loss of Businesses

The ALRT guideway, station and the potential bus loop will require the purchase and demolition of ten buildings and the removal and relocation of 15 businesses (12 retail establishments and three offices). The retail loss creates serious impacts as the 12 businesses represent 20 percent of all ground floor retail uses between Grandview Cut and 12th Avenue on Broadway and Commercial Drive. Opportunities for new development to re-establish retail continuity around the station should be examined. The redevelopment generated by the transit station could have the effect of raising rents and lease rates on Broadway and Commercial Drive. The long established small businesses now operating there, particularly on the west side of Commercial Drive, could be forced to relocate. Measures will have to be introduced in the station area plan to retain these uses or provide opportunities for similarly scaled uses where possible.

B. Loss of Access/Parking

1. Northeast Triangle Site (See Figure 9)

The two remaining properties on the north side of Broadway east of Commercial Drive are isolated by the Grandview Cut and Broadway. Lot depth and width is 15.2 metres (50') and there is no rear access. While these properties are not directly affected by the ALRT guideway, the increased bus movement through the Broadway and Commercial Drive intersection and potential northeast bus loop will inhibit access and parking especially if on-street parking and loading on Broadway is eliminated.

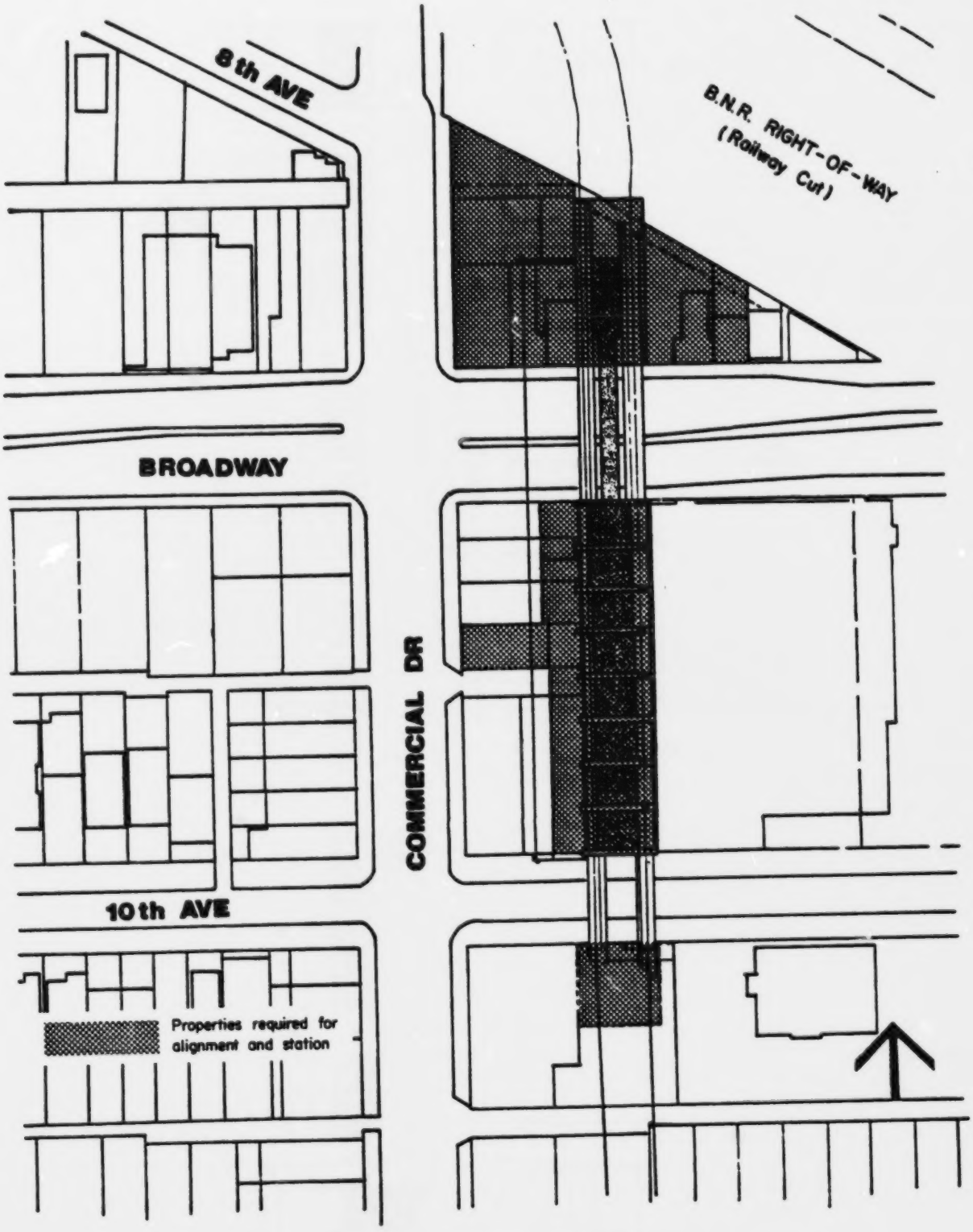


Fig. 7 B.C. TRANSIT LAND ACQUISITION PATTERN AT THE BROADWAY STATION

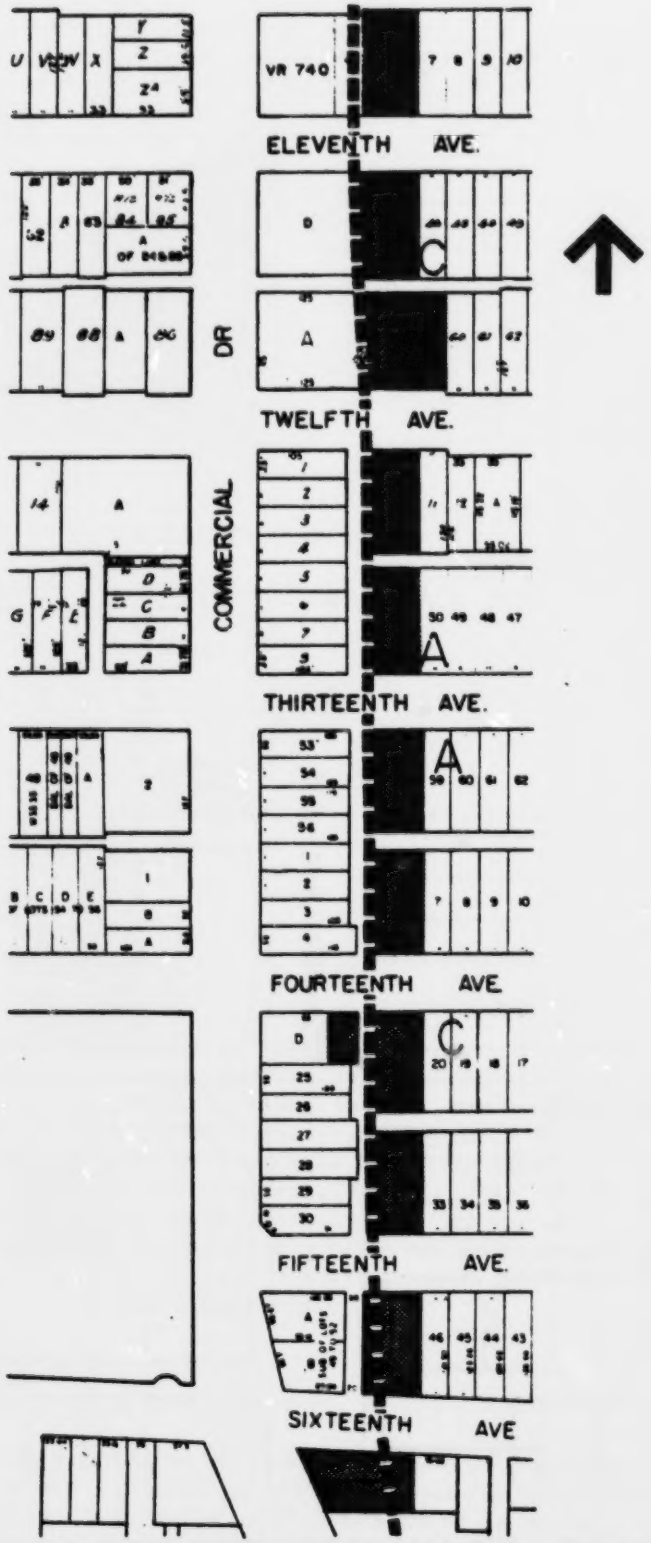


Fig. 8 B.C. TRANSIT LAND ACQUISITION PATTERN ALONG THE LANE EAST OF COMMERCIAL DRIVE

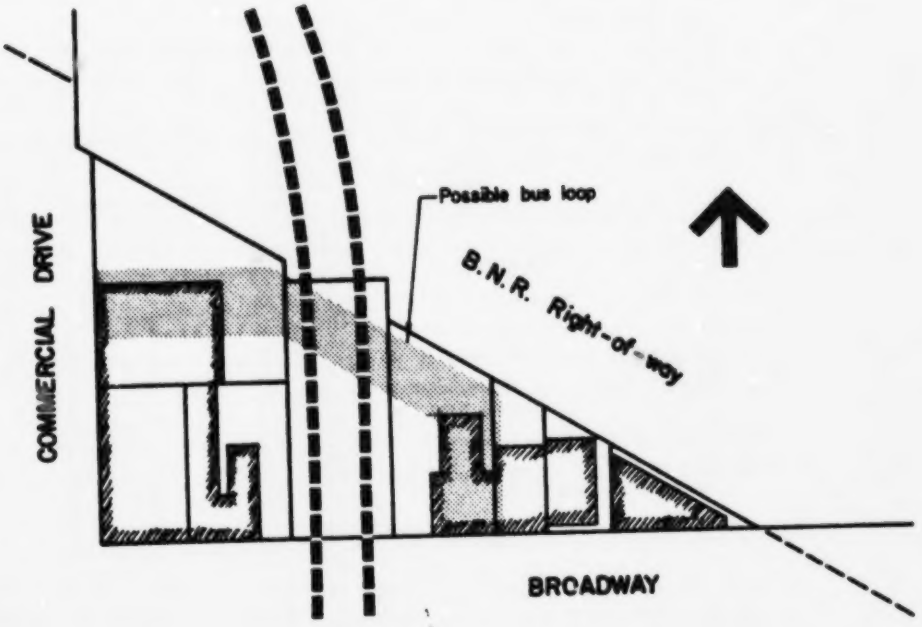


Fig. 9 NORTH-EAST TRIANGLE SITE

In the short term, B.C. Transit could provide these parcels with off-street parking on the adjoining sites it has acquired until such time as the bus loop is constructed and/or redevelopment of the parcel takes place. In the long term, the consolidation and redevelopment of the entire northeast triangle site would eliminate these problems. In addition, as pointed out by Allen Parker Architects, designers of Broadway Station, there are benefits to consolidating the entire parcel in a redevelopment. These are:

a) The acquisition of the total site would permit efficient development of below-grade facilities such as parking as it would be difficult to accommodate parking in the area under and west of the guideway.

b) There is the possibility of constructing columns between the guideways to support development above. This would allow the parcel of land west of the guideway to be connected by development of the parcel east of the guideway thereby permitting the construction of reasonable size floor areas.

c) A development exclusively west of the guideway would require a parking ramp and several loading bays facing directly onto Commercial Drive. All this vehicular access would conflict with present plans for heavy transit related pedestrian activity at this location. Vehicular access would be better located as far east as possible on Broadway, which would require assembling the whole block for eventual comprehensive development.

All these factors suggest that the entire northeast triangle be eventually assembled for comprehensive development including a possible bus loop.

2. The Station Site (see Figure 10)

Due to the high cost of property acquisition, B. C. Transit proposes not to acquire the existing Canadian Imperial Bank of Commerce and Tommy O's Restaurant. Keeping these vital retail uses helps maintain the viability of the adjacent retail area and keeps a continuous retail frontage which helps facilitate pedestrian movement south of the station along Commercial Drive.

The station location immediately west of Safeway requires the closure of the lane between Broadway and 10th Avenue. The Bank of Commerce depends on access to that lane for its 8 space parking area at the rear of the building. Alternative access is available on the east-west lane between Broadway and 10th Avenue (see Figure 10),but this would require access through lot D. By consolidating all four lots north of this lane, access can be assured to the Commerce Bank in any future redevelopment scheme.

The Safeway operation will continue but the Safeway employee parking lot will be required for the station site (see Figure 10). As the Safeway site has a large amount of surplus parking when compared to by-law requirements, the loss of 13 staff parking stalls is not a real problem.

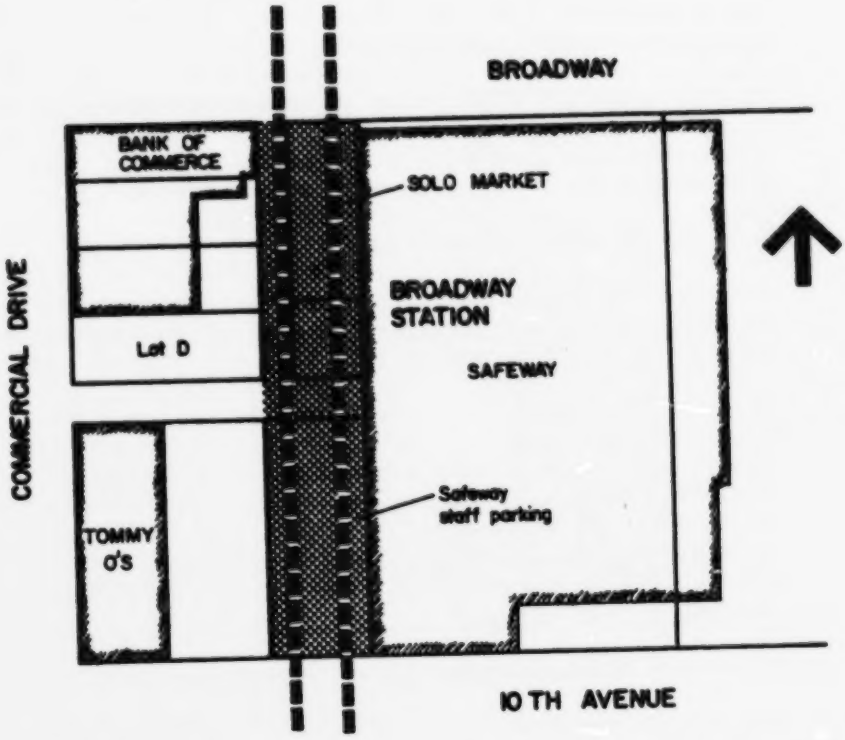


Fig. 10 THE STATION SITE

The garbage disposal site will have to be relocated from Safeway's west side and adequate fire separation (900 mm thick structural wall) is required between the station and the Safeway building. A rated fire exit is also required from the west side of the Safeway building through the station to either 10th Avenue or the east-west lane between Broadway and 10th Avenue. A preliminary decision has been made to use the east-west lane. B.C. Transit's decision to relocate Safeway's utilities and orient the fire exit to the lane could seriously limit the options for redevelopment. There are considerable cost savings to B.C. Transit by orienting the utilities and fire exit to the east-west lane instead of to 10th Avenue. But further study is required to determine the costs that may be added to a future redevelopment scheme since it is much more desirable and economic to consolidate all parcels between Broadway and 10th Avenue west of the station into one development site.

3. Shoppers Drug Mart (see Figure 11)

The guideway passes over the Shoppers Drug Mart causing direct impact to the building and considerable disruption to their parking lots behind the building and at 1723 East 11th Avenue (see Figure 11).

If it is not possible to retain the 22 required off-street parking spaces for Shoppers Drug Mart, it is recommended that an alternate off-street parking spaces be secured by B.C. Transit or the landowner within 45 metres of the building. This would avoid creating a non-conforming use and increasing the existing on-street parking problems in the area. B.C. Transit could provide off-street parking on a portion of the land it has acquired under the guideway adjacent to 1723 East 11th Avenue.

4. Grandview Medical Centre (see Figure 12)

One of the guideway columns disrupts the access to the surface parking lot of the Grandview Medical Centre. As in the case of Shoppers Drug Mart, B.C. Transit needs to ensure that no parking spaces are permanently lost through construction of ALRT.

The increased traffic generated by the station and future redevelopment in the commercial and residential areas north of 12th Avenue could be somewhat ameliorated through the provision of a north-south lane between 12th Avenue and the lane south of 10th Avenue. B.C. Transit is acquiring property for the guideway to the rear of the commercial area which would have been required for lane dedication had redevelopment occurred on these lots.

A new lane paralleling Commercial Drive would funnel traffic onto the cross-streets and would eliminate the need for direct lane access onto Commercial Drive. The closure of the existing lane accesses would provide additional development frontage on Commercial Drive, adding to retail continuity. The lane could be located east of the guideway columns as shown in Figure 13.

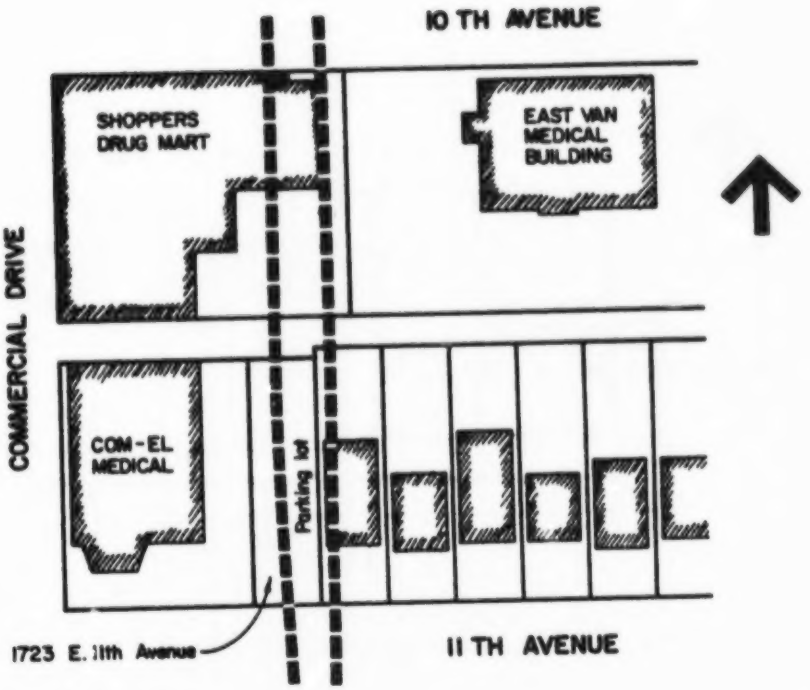


Fig. II SHOPPERS DRUG MART SITE

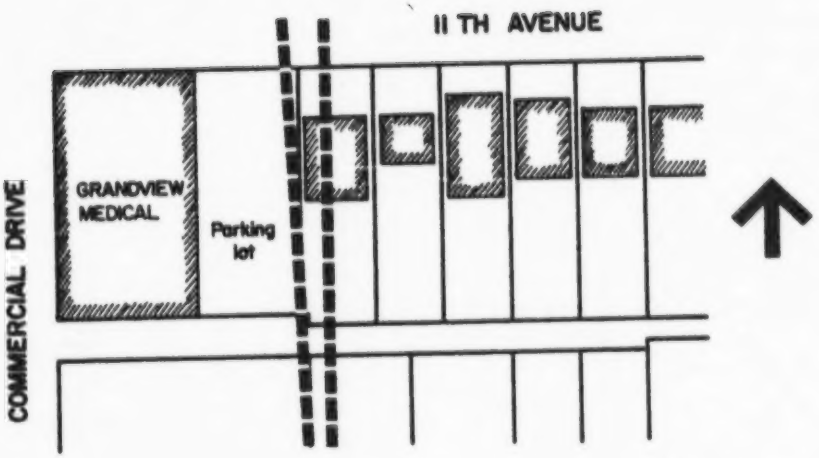


Fig. 12 GRANDVIEW MEDICAL CENTRE

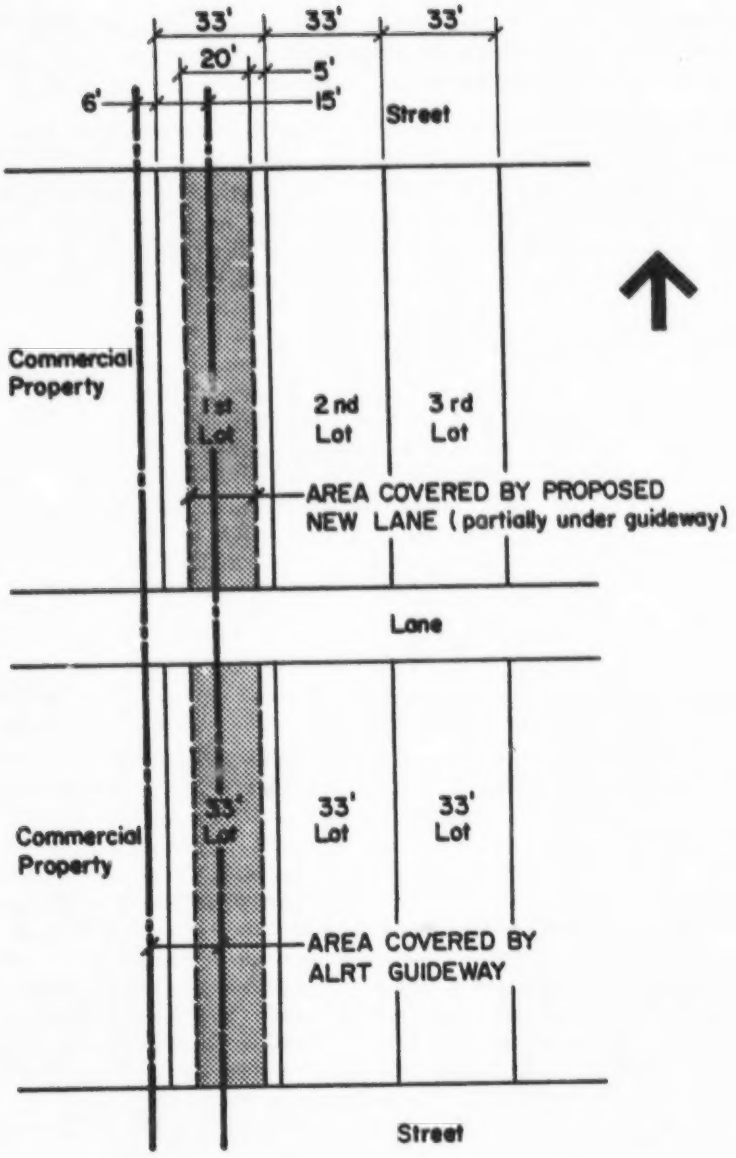


Fig. 13 LANE DEDICATION
(East of guideway, north of 12 th Avenue)

C. Potential Overspill Parking

The Broadway/Commercial Drive area depends upon short-term parking to maintain its viability as a district shopping centre. Increasingly, parking is spilling over onto adjacent residential streets generating complaints from homeowners and tenants.

The station location will create a temptation for more local commuters to park near the station and ride ALRT to work thus worsening existing parking problems. City staff should, in consultation with local merchants and residents, recommend measures in the station area plan to ensure that on-street parking is made available to customers and residents and not ALRT commuters.

D. Loss of Privacy, View and Noise

The occupants of the upper storey spaces on the east side of Commercial, between 10th and 12th Avenue, and in the East Van Medical building on 10th Avenue, will suffer some inconvenience (or reduced satisfaction with their quarters) which could translate into reduced lease rates and/or leasing difficulty experienced by the building owner. These impacts could reduce the value of the property. However, the positive impacts of ALRT such as increased accessibility to the downtown and Kingsway corridor and the large number of pedestrians travelling to and from the station, thereby improving the viability of commercial operations, may increase property values. The functional problems, however, will remain and are most difficult to mitigate.

E. Vibration Levels

Based on the evaluation of various light rail transit systems done by Acres Consulting Services Ltd. for the Metropolitan Toronto Planning Department, it was determined that vibration levels will be below the threshold of perception of most people.[1] Doctors in the East Van Medical building are concerned about the effects of low level vibrations on sensitive audiometry and other scientific instruments. However, there are no satisfactory data available to predict these impacts at this time and further study is required.

There are few, if any, direct ALRT impacts on the commercial area south of 12th Avenue except for some disruption that may take place during construction. The station is too far away to exert significant redevelopment pressure here. Many of the commercial uses are marginal and the type and scale of future development will have to be addressed in the station area plan.

1 See Acres Consulting Services Ltd. for Metropolitan Toronto Planning Department, Scarborough Town Centre Light Rail Transit Vibration Evaluation Report #5. (Toronto, December, 1975).

11. IMPACTS IN THE RESIDENTIAL AREA

A. Loss of Units

Based on B.C. Transit's current acquisition pattern, 23 homes containing approximately 39 dwelling units will be demolished adjacent to the east lane to make way for the construction of the overhead ALRT system. These units have served as relatively low cost family oriented accommodation and should be replaced by new affordable units. The station area plan should ensure that these, and any other units, required for ALRT impacts are replaced.

B. Physical Intrusion

The height and bulk of the guideway will result in a significant physical intrusion into the surrounding neighbourhoods. The ALRT vehicles over 9 metres (30') in the air will overshadow the adjacent homes which average 7.7 metres (25') in height (see Figure 14). The operation of ALRT will result in a loss of privacy in backyards and in homes with windows facing the guideway as ALRT riders will have a clear line of sight into these spaces. Canada Mortgage and Housing Corporation (CMHC) site planning criteria specifies a minimum separation of 18m between outdoor areas and other uses unless the outdoor area can be screened from the ALRT riders. The physical presence of the guideway will lessen the sense of openness and many will regard the large concrete columns as unattractive additions to the urban landscape. While most of the impacts will be on the adjacent homes' living environment, the physical intrusion of the guideway will be visible to others who use the lanes or the cross-streets.

Landscaping could be used to minimize the physical intrusion of the guideway. However, the vegetation would have to be tall and dense enough to obscure a 7 metre (23') high guideway and trains 9 metres(30') in the air. Coniferous trees would be preferable as they do not lose their leaves in the winter (Figure 15). Tall deciduous trees with crowns six metres to ten metres in width would be large enough to reduce the impact of the guideway at cross-streets.(Figure 16). It should be stressed that landscaping is a long-term measure. It will take many years for trees to reach maturity and be large enough to effectively screen the guideway.

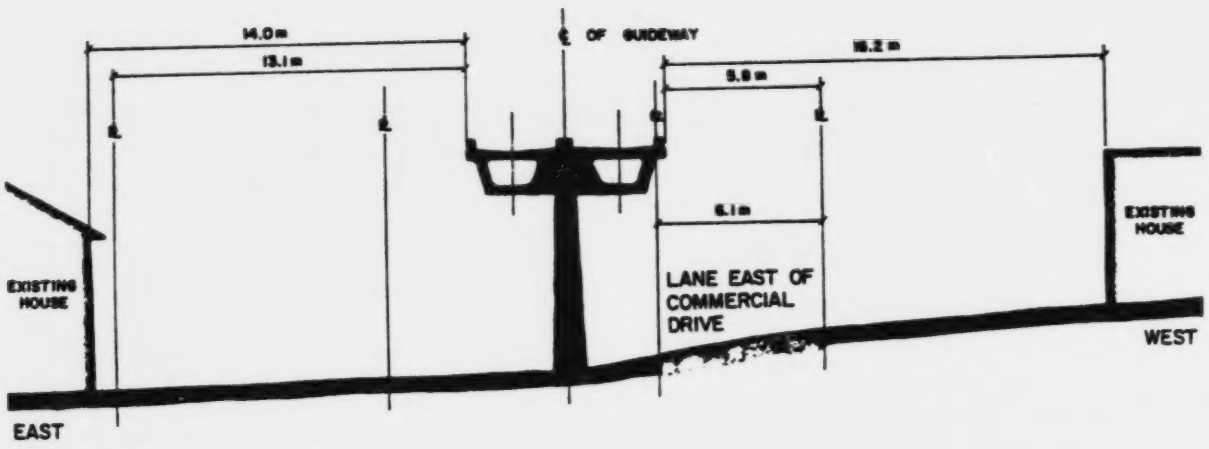


Fig. 14 SECTION OF ALRT IN THE EAST LANE OF COMMERCIAL DRIVE (15th Avenue)

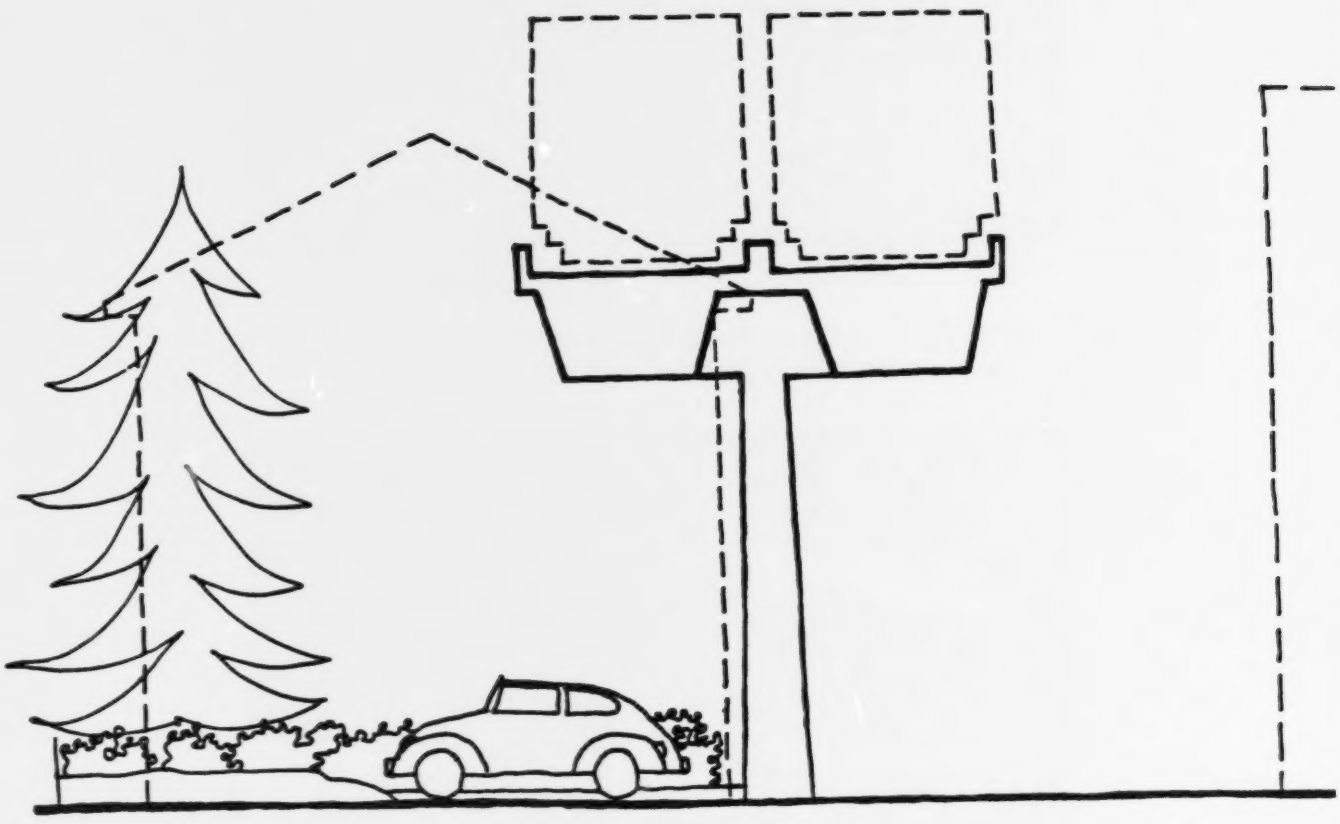


Fig. 15 POSSIBLE LANDSCAPING (East of lane)

Fig. 16 LANDSCAPING AT INTERSECTIONS

GUIDEWAY Without Landscaping

(Guideway has a major visual impact on the front yards of homes along the street).

GUIDEWAY With Landscaping

(the visual impact of the guideway on homes can be significantly reduced with Landscaping).

C. Noise Levels

Future noise levels have been projected for ALRT when it begins operations in 1986 and when ALRT is functioning at its designed capacity.[2] As well as the number of trains per day, ALRT noise levels are also influenced by the train speed, the presence of barriers and the existing noise levels (ambient noise) in the neighbourhood.

Using all these factors, future noise levels were predicted and the contour lines were plotted for 1986 and potential capacity as shown in Figure 17.[3] Annoyance with noise has been found to increase sharply when noise levels exceed 55dB (Leq), so CMHC has adopted 55dB (Leq) as the maximum acceptable outdoor noise level for residential projects with Federal funding. Under 1986 operating conditions the first four homes east of the guideway and all the existing residential property west of the guideway will have a potential noise problem. More homes would be affected if ALRT is expanded to its potential capacity. These homes will have outdoor noise levels in excess of 55dB (Leq) and those that are not insulated or with openable windows that face the guideway could have excessive interior noise levels as well.

These noise problems are difficult to deal with at the source. A 0.7 m noise barrier has already been designed for the guideway and it has been calculated that raising that barrier will only have a marginal effect on noise levels. Completely enclosing the train in a transparent tunnel is impractical due to qualities of glass and plastic (expensive and prone to breakage or scratching) and the necessity of redesigning the guideway support columns to accommodate the additional weight.

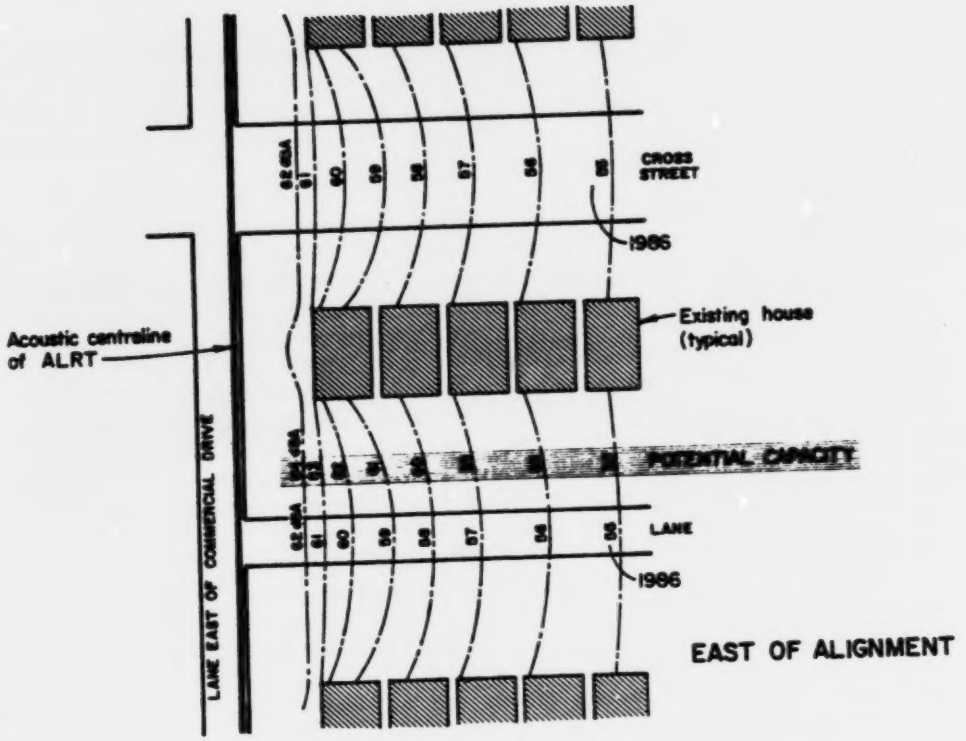
Unfortunately, landscaping cannot deal effectively with the excessive noise levels in homes and yards adjacent to the guideway. Trees and shrubs have been found to provide very little shielding from noise, although some studies indicate that not seeing the noise source has some psychological benefits.

Erecting a barrier at or near the receiver is also difficult as the guideway is over 7 metres (23') in the air. A traditional 2 metre (6') high backyard fence will provide virtually no protection from ALRT noise both east and west of the guideway.

[2] see Vancouver Planning Department ALRT: A Noise Study (Vancouver, April, 1983) and Harford, Kennedy, Wakefield, Ltd., for B.C. Transit, "Noise Assessment of Vancouver ALRT Along the East Lane of Commercial Drive". 1983.

3 The 55dB (Leq) noise contour was determined by using the following variables:

a) Frequency of Trains - These reflect 1986 operations and potential capacity of the ALRT system.
b) Train Speed - As trains begin to decelerate 200m away from the station maximum ALRT noise levels decrease to a negligible amount when the trains stop in the station.
c) Ambient Noise Levels - These were assumed to average 52dB (Leq) except along 12th Avenue where they are in the order of 60dB (Leq).
d) Sound Reflection - Noise levels are estimated to be 2dB (Leq) higher for residential properties on 11th Avenue where abutting three-storey commercial buildings will reflect sound waves from the guideway back to the residential area.



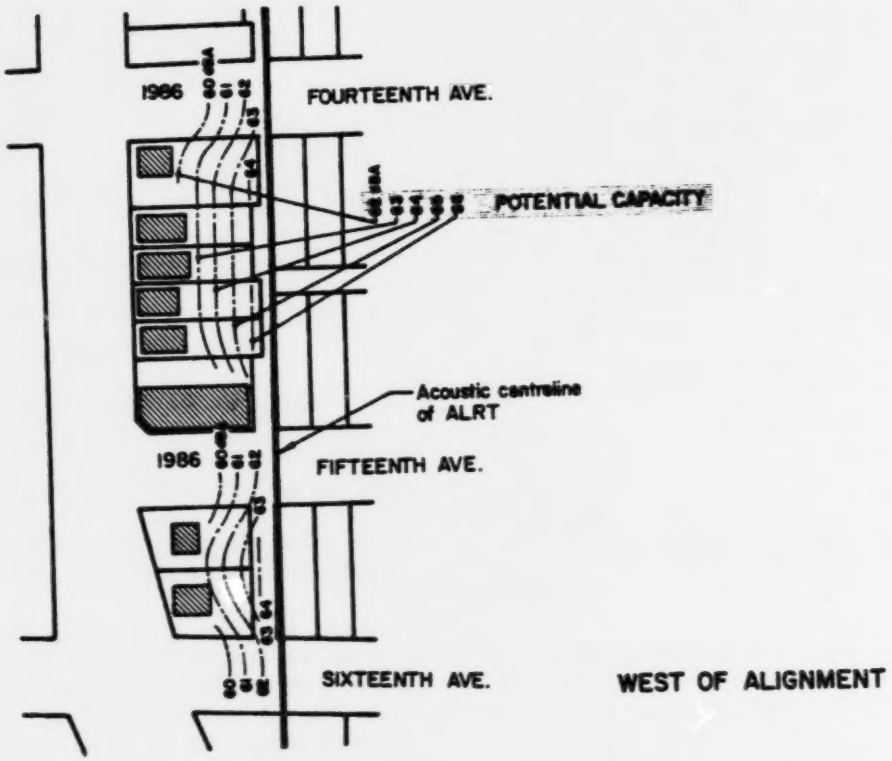


Fig. 17 PREDICTED NOISE CONTOURS – (dBA) Leq (24)

One expedient way to minimize the noise impact for current owners is to have B.C. Transit purchase adjacent property owners on a request-to-sell basis. Properties could then be resold with a caveat placed on the title alerting future owners to the noise problem created by the elevated ALRT guideway. This should only be regarded as a short-term option, as there could be a tendency for absentee owners to acquire these homes and allow them to deteriorate through neglect and lack of maintenance.

The fact that noise will likely be a problem for a number of homes both east and west of the guideway means that in the long-run erecting buildings between the ALRT guideway and the existing residential area appears to be the most effective way to deal with both noise and the impact from physical intrusion. Intervening structures are a cost effective use of land since the structure fulfills the dual role of providing housing and a noise screen.

These new buildings should be designed to restrict penetration of ALRT noise into their interiors while at the same time serving as a noise screen to protect existing houses located further to the east. Even though these buildings will need to be located close to the edge of the guideway, it should be possible to provide adequately quiet noise levels inside them by eliminating windows on the exposed wall and by careful layout of the building interiors, (using single loaded corridors for example). It will probably be possible to permit some light to enter through this wall by providing areas of glass block for example. Fortunately, noise from the ALRT is concentrated in the mid to high frequency range (500 and 1,000Hz octave bands) where most building materials are very effective in attenuating sound. However, construction costs may be more expensive than the norm in order to reduce the noise within the building. Since intervening structures do not usually look like other conventional or traditional forms of housing, many consumers may find such buildings less attractive and therefore they may be more difficult to market. Thus, these buildings must be very carefully designed.

The major issues that have to be addressed are:

- the amount of land required for the development; and

- the scale and form the development will take.

B.C. Transit has proposed one redevelopment scheme for the properties directly east of the guideway. (Figures 18, 19, 20). Originally the 17.1 metre (56')wide scheme could have been built on the two lots B.C. Transit is acquiring adjacent to the east lane, but the new guideway design only leaves 15.2 metres (50') of residual property left for landscaping and redevelopment.

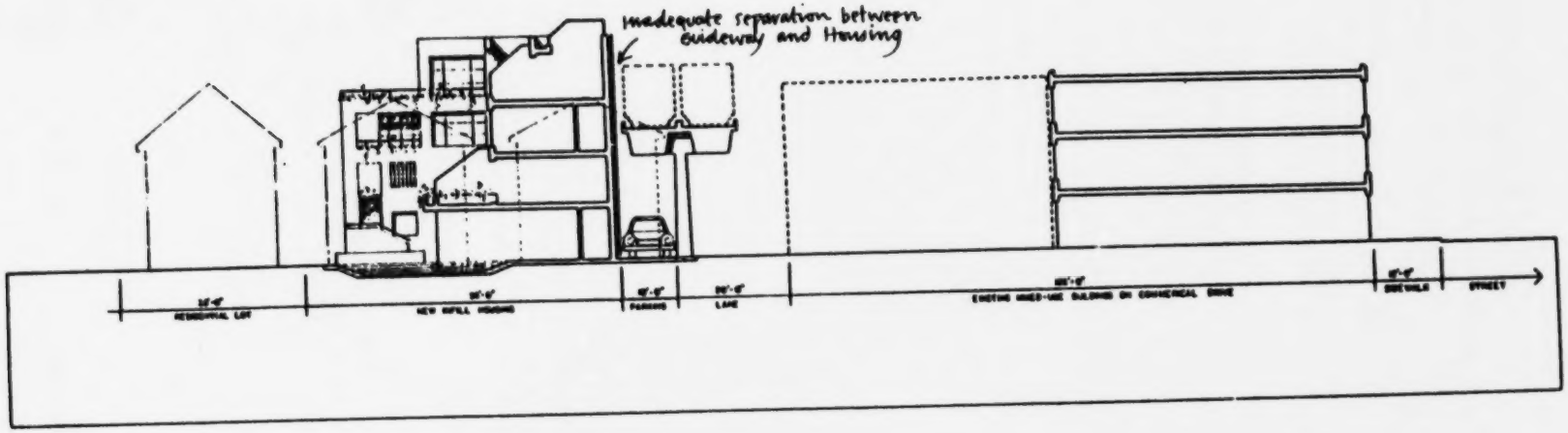


Fig. 18 ALRT HOUSING CONCEPT EAST OF THE LANE
2 LOT OPTION (Allen Parker & Associates)

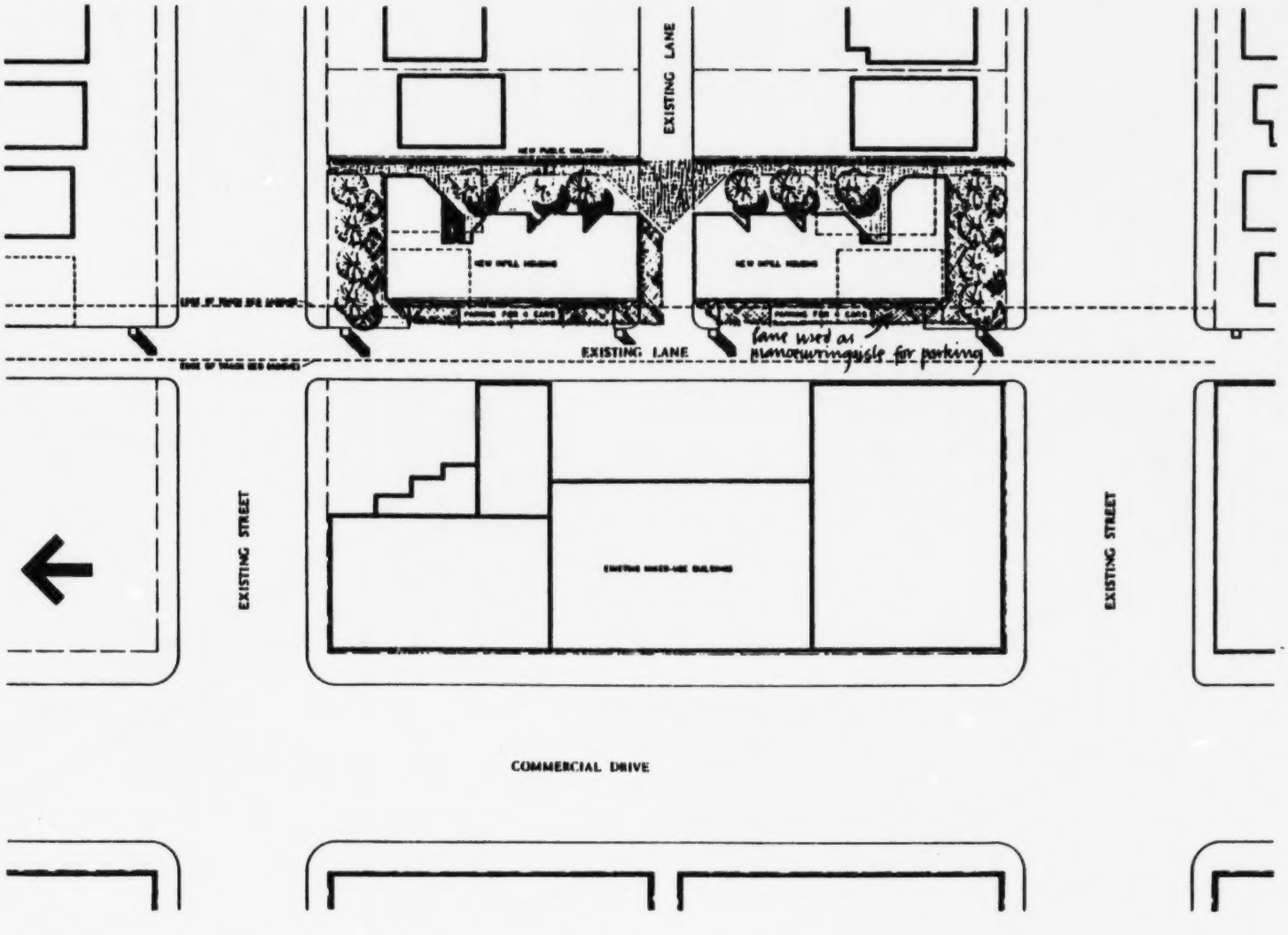


Fig. 19 2 LOT OPTION (Allen Parker & Associates)

Fig. 20 2 LOT OPTION (Allen Parker & Associates)

Should a building scheme be implemented along these lines, the structures would exceed the height of the ALRT guideway by approximately 5m which would reduce levels on their far side by up to 20dB (Leq). This is the maximum attainable from any noise barrier before refraction (bending) of sound waves over the top limits the performance of the barrier.

The buildings would have to be as continuous as possible along the alignment (in the B. C. Transit scheme, front yard setbacks were assumed to be 3m with no rear yard setbacks) but openings would, of course, occur at each cross-street and lane. Since the openings at cross-streets will be much wider than at the lanes, the greatest potential for any adverse impact from ALRT noise will be at the front faces of the houses on the cross-streets. Even though there will be a direct line of sight from these houses to ALRT vehicles as they pass over the cross-streets, a continuous line of new buildings would still reduce noise propagation along the cross-streets significantly relative to the noise levels predicted without the redevelopment screen. Noise levels predicted with intervening structures in place are shown in Figure 21. This illustrates that redevelopment can reduce but not eliminate the noise impacts for the front yards of homes east of the ALRT guideway. Levels along the lanes would be considerably lower than the levels along the cross-streets due to the much smaller openings there.

Preliminary analysis undertaken by the Planning Department has shown that more land than originally envisaged by B. C. Transit may be required to create livable residential units, allow for landscaping adjacent to the guideway and scale the development down to fit the existing character of the neighbourhood.

There are two basic alternatives for obtaining enough land for redevelopment of intervening buildings:

- Private sector land assembly and redevelopment.

- Public sector land assembly and private or public sector redevelopment.

Intervening residential structures could be developed by the private sector according to planning and design guidelines created for the area. The major advantage of allowing private sector land assembly is that the development could take a variety of forms and sizes creating a more diverse environment. The implications of this alternative are that the City would have to pursue rezoning to encourage the private sector to undertake land assembly. Densities comparable to at least other RM-3A apartment areas would be needed to encourage private sector participation. Should the current or similar economic conditions prevail when the system opens in 1986, redevelopment will not occur quickly, especially when considering the previously noted problems of marketing intervening structures. This would leave some existing housing east of the guideway with a considerable noise problem in outdoor recreation areas and potential noise problems within the units themselves.

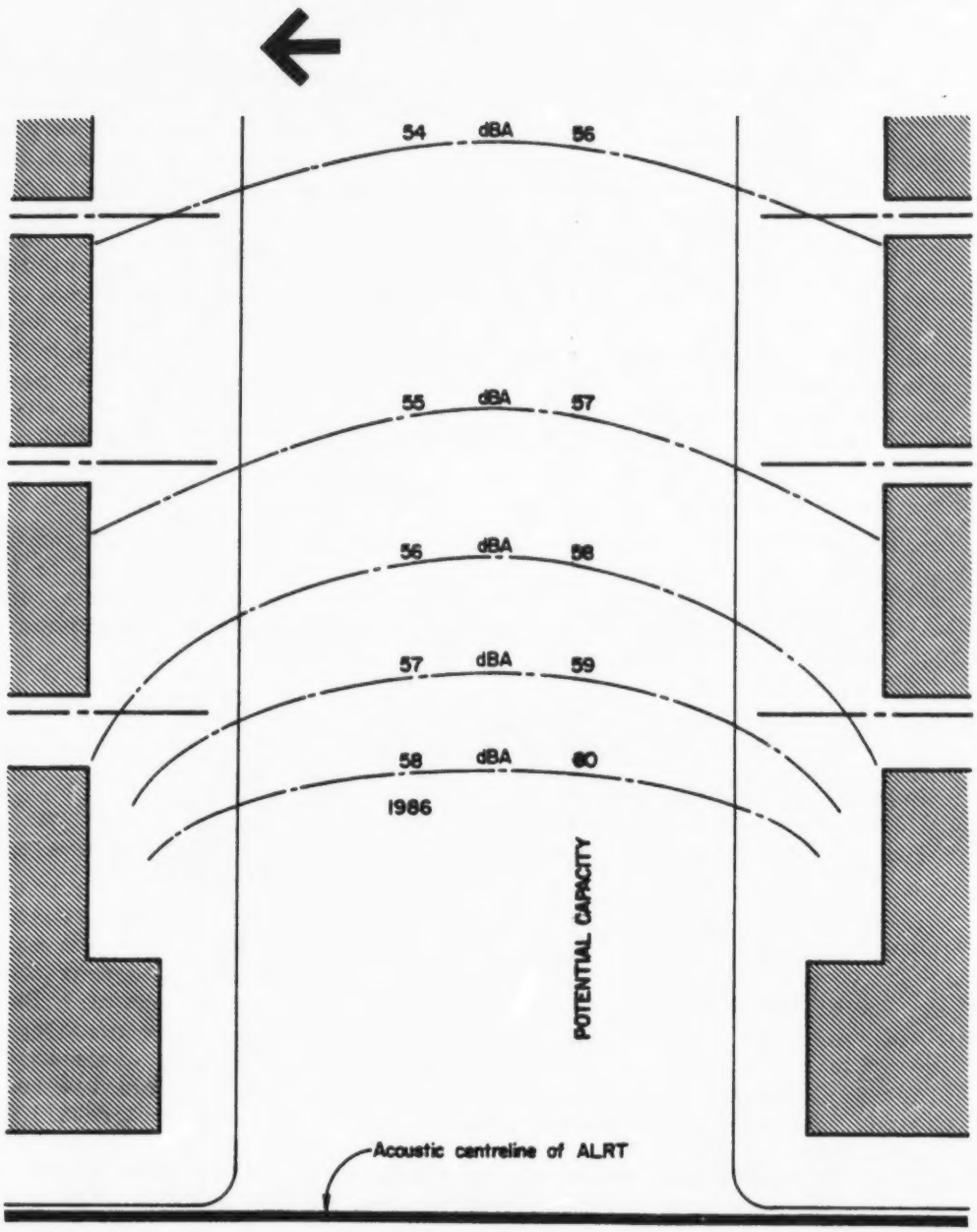


Fig. 21 PREDICTED NOISE CONTOURS – (dBA) Leq (24) ON TYPICAL CROSS STREET EAST OF ALRT ALIGNMENT (with redevelopment proposal)

In the second alternative, land assembly to minimize ALRT impacts would be undertaken by B. C. Transit or the City of Vancouver. This would require, as a minimum, the purchase of an additional lot except for north of 12th Avenue where the two lot purchase provides 100' of property width which is enough for redevelopment. Densities comparable to other RM-3A areas would still be required to provide the necessary noise attenuation. The major advantage of this alternative is that appropriately designed housing to minimize ALRT impacts could be constructed to coincide with the ALRT opening. The challenge would be to create a variety of housing forms and styles on parcels of a similar size.

Substantial redevelopment adjacent to the predominately single family area could have the effect of destabilizing the entire neighbourhood unless zoning regulations and development guidelines are put in place through the station area plan. The station area plan will control the extent and scale of redevelopment adjacent to the ALRT guideway.

The residential properties west of the lane will have the most serious noise impacts and loss of privacy. The elevated ALRT guideway on one side and Commercial Drive on the other will create a combined noise impact on the dwelling units in between. Backyard amenity space will be exposed directly to ALRT noise and the guideway is close enough to overlook rear yards and windows.

Handling the noise impacts of the residential uses west of the lane (between 14th Avenue and 16th Avenue) also presents a difficult challenge.

There are three options:

- redevelop for office/retail/institutional uses.
- redevelop for residential and include measures to deal with the physical intrusion of ALRT and its noise impacts.
- redevelop for retail/office at grade and residential above.

The constraints of the site make the design of residential units difficult. ALRT on one side and Commercial Drive traffic on the other create a combined noise impact on the dwelling units in between. Office/retail development is more noise tolerant and therefore, it could be argued, more suitable in this area. In addition, redevelopment pressure from the private sector will likely be for office development given that the area is currently zoned C-2.

Despite these arguments, housing development, if properly designed can create a viable residential environment west of the lane adjacent to Commercial Drive. Clark Park is directly across from the site on the west side of Commercial Drive and provides a pleasant recreation space.

Office/retail development south of 14th Avenue (beyond the five-minute walking distance to the station) spreads the development pressure away from the station, resulting in ribbon, car-oriented development, rather than nodal, transit related development. Office/retail/institutional development in this location would generate traffic and parking problems for the adjacent residential community. The Overall Report on the Planning Context for ALRT Development contains recommendations which discourage office development outside the core area of Vancouver and office development here would violate these objectives.

Mixed use development has the advantage of providing some retail and/or office development without unduly compromising overall objectives. If office/retail uses which generate lower than average amounts of traffic were encouraged, the impacts on the adjacent residential community could be minimized. Retail or office at grade would also have the effect of raising residential development high enough to provide views over the Clark Park retaining wall into the park itself.

The major difficulty in implementing any scheme will be the reluctance of the private sector to initiate land assembly in this isolated area between two transportation arteries. Demand for commercial development here is currently low and the distance to the station is too far for ALRT to generate significant redevelopment pressure. Experience in other cities indicates the most likely scenario for this area, assuming no public sector initiatives, is a gradual decline in the quality of existing units through neglect and lack of maintenance. Some public sector initiative may therefore be necessary.

The impacts of the elevated ALRT guideway have always been recognized to be the most serious in the residential area adjacent to the east lane. The measures discussed above will help to minimize the effects but the physical presence of the guideway and the noise of the train cannot be completely eliminated. The increased accessibility created by the station will inevitably change the character of the area and will generate some redevelopment particularly in the residential area north of 12th Avenue. Controlling the pace and extent of that change is the primary purpose of the station area planning program.

IMPLEMENTATION OF IMPACT MITIGATION MEASURES

There are essentially four types of mitigation measures that have been suggested to handle the impacts of ALRT.

A. Treatments on the ALRT right-of-way including landscaping, replacement of parking under the guideway, station linkages, etc.

B. Ameliorative treatments on adjacent properties or public areas to protect current owners and residents, including replacements of lost parking and access, noise abatement, building adjustments, relocation assistance, landscaping, etc.

C. Property acquisitions, some mandatory and some at owner request, for new lane dedications, construction of intervening buildings as noise screens and to assist severely impacted owners next to the ALRT station or guideway.

D. Application of new zoning, land use provisions and public investment to foster future development and densification that are compatible with the community.

The first two measures fall within B. C. Transit's reponsibility, while the third measure could be implemented by both the City of Vancouver and B. C. Transit. New zoning and land use provisions are the responsibility of the City of Vancouver.

A. Measures on the ALRT "Right-of-Way"

1. Landscaping/Provision of Parking

The City of Vancouver has already prepared a report on landscaping guidelines for the entire ALRT alignment including the portion adjacent to the east lane of Commercial Drive.[4] The landscape concept for Commercial Drive is shown in Figure 22. The concept is flexible enough to allow space to be developed for vehicular parking to compensate for any loss of parking created by the guideway columns and to ease the burden of parking congestion that currently exists for Commercial Drive shops. As discussed previously, landscaping, if given enough time to reach maturity, can minimize the visual impacts of the guideway and prevent the loss of privacy. It should be stressed however, that this is a long-term solution. Landscaping will not immediately help the properties directly adjacent to the guideway and it will not resolve the noise problem.

4 City of Vancouver, "ALRT Alignment Landscaping Guidelines". A Discussion Paper, 1983.

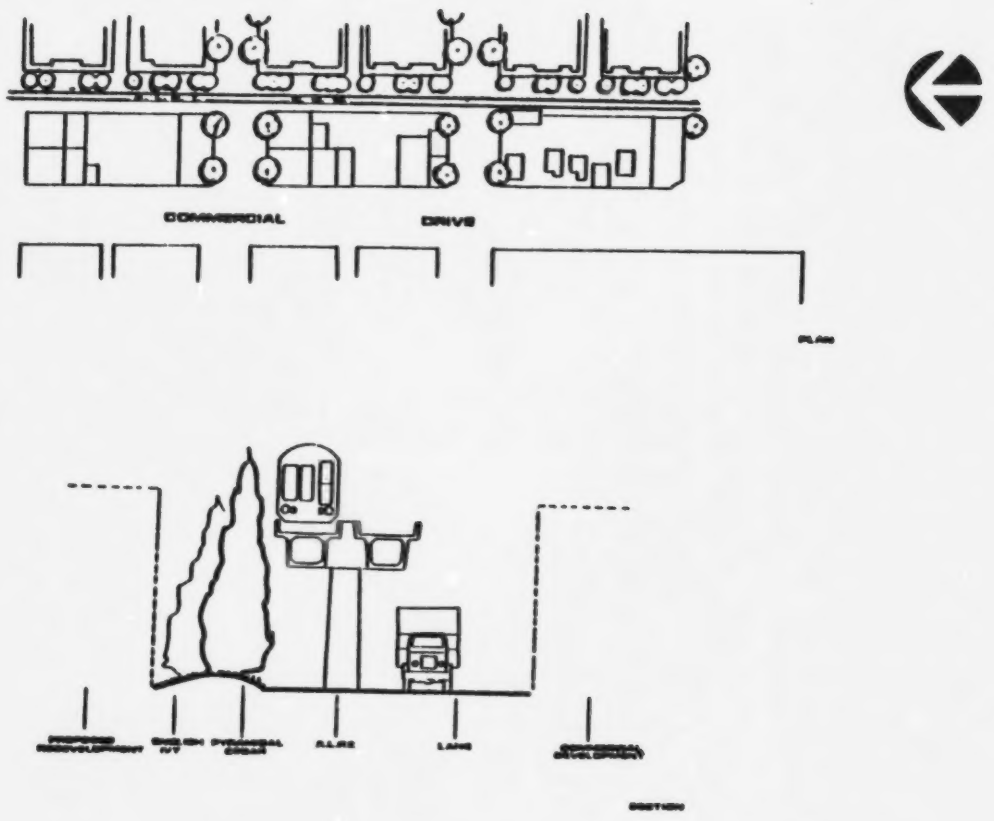


Fig. 22 LANDSCAPING CONCEPT FOR EAST LANE OF COMMERCIAL DRIVE

2. Amelioration Measures

These measures are required to deal with loss of access and parking created by guideway columns and the station site. These should be negotiated with the individual owner and B.C. Transit on a case-by-case basis and are outlined in the previous discussion of commercial impacts.

3. Property Acquisition Recommendations

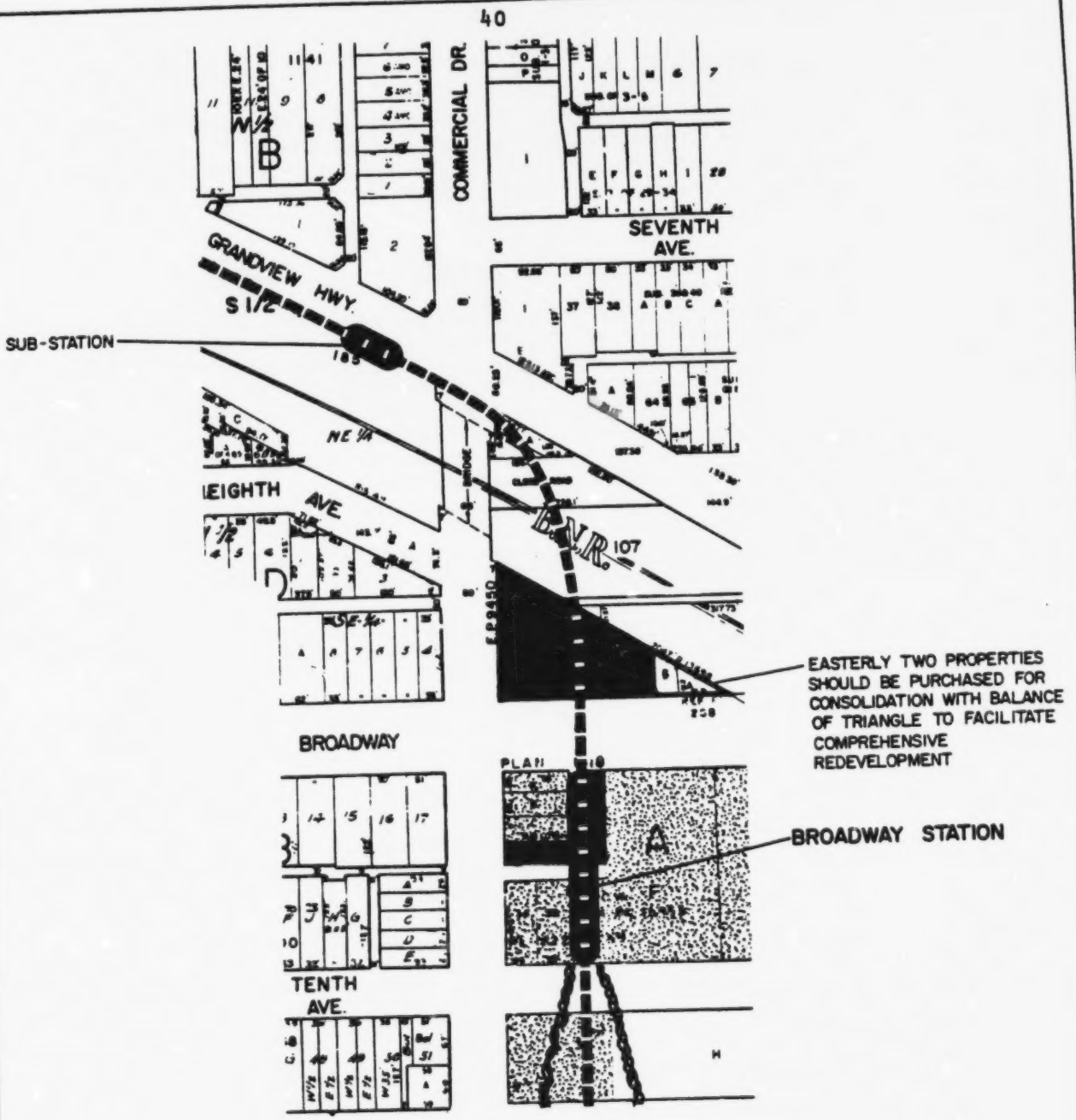
Property acquisitions by B.C. Transit are felt to be necessary for properties with serious and unresolvable impacts created by the presence and operation of ALRT. These include loss of privacy, serious noise impacts, etc. Property acquisition is also appropriate for property owners who experience significant ALRT impacts and are not prepared to wait until mitigation measures have been implemented, e.g. (the provision of intervening redevelopment as a noise screen). The City of Vancouver has developed three categories for property purchase which are illustrated on Figures 23 to 25. These are:

a) B.C. Transit Committed to Purchase - Based on our latest understanding of B.C. Transit's acquisition committments.

b) B.C. Transit Should Purchase - These properties will experience serious and unresolvable impacts as a result of the presence and operation of ALRT. These include loss of privacy, serious noise impacts, shadowing, etc. which will significantly reduce the livability of residential units.

The two residentially zoned properties between 15th and 16th Avenues west of the lane should be purchased by B.C. Transit. These properties will now have the elevated ALRT guideway on one side and Commercial Drive traffic on the other. This creates a combined noise impact on the dwelling units between. Backyard amenity space is exposed directly to ALRT noise and the guideway is close enough to overlook rear yards and windows. The small lot depth (lot depth is only 21.3 metres (70') at 16th Avenue) and the fact that the existing buildings have greater floor space than the current zoning allows makes redevelopment difficult and private sector assembly extremely unlikely. It is therefore recommended that the two lots between 15th and 16th Avenues be acquired by B.C. Transit. Acquisition costs are estimated to be $255,000.00.[5]

5 Values based on 1982 B.C. Assessment Authority market values.



City of Vancouver
Planning Department

Fig. 23

RECOMMENDED ACQUISITIONS
- B. C. Transit Committed to Purchase
- B. C. Transit Should Purchase
- B. C. Transit Should Purchase at Owner's Request
- B. C. Transit Agree to Provide Amelioration (e.g. Noise Attenuation, Landscaping)

OTHER SYMBOLS
- ALRT Structures (Stations, Substations)
- ALRT Track (Elevated)
- ALRT Track (at Grade)
- ALRT Track (Below Grade)
- City-Owned Land
- B. C. Hydro Rail
- Noise Contour (55 dB Level - 1986)
- 8 Sectional Reference (See Accompanying Drawings)

ALRT Alignment
Suburban Property Proposals

Date	July, 1983
Drawn	I.G.C.
Scale	1:2400

No. 1

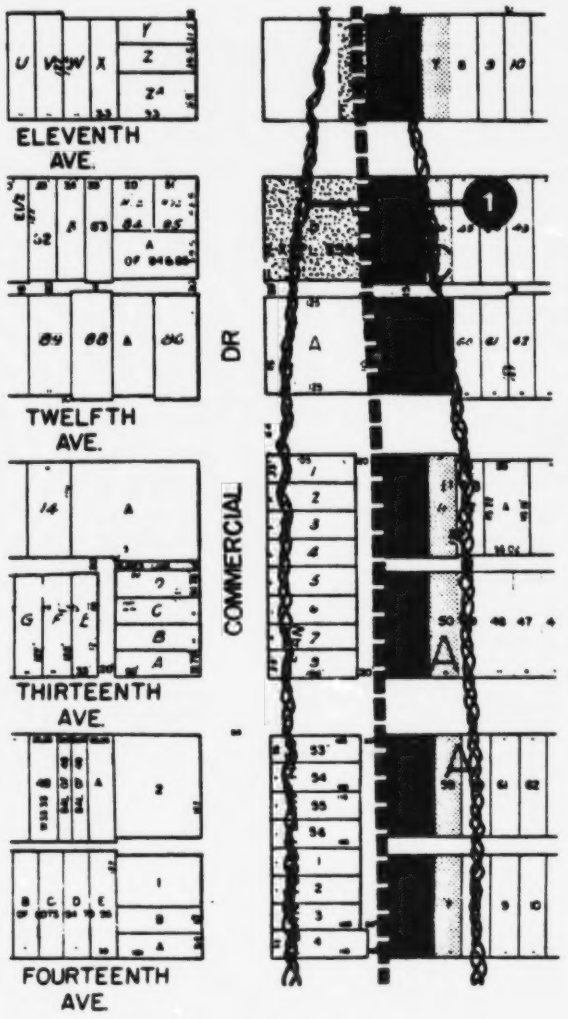


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Fig. 24

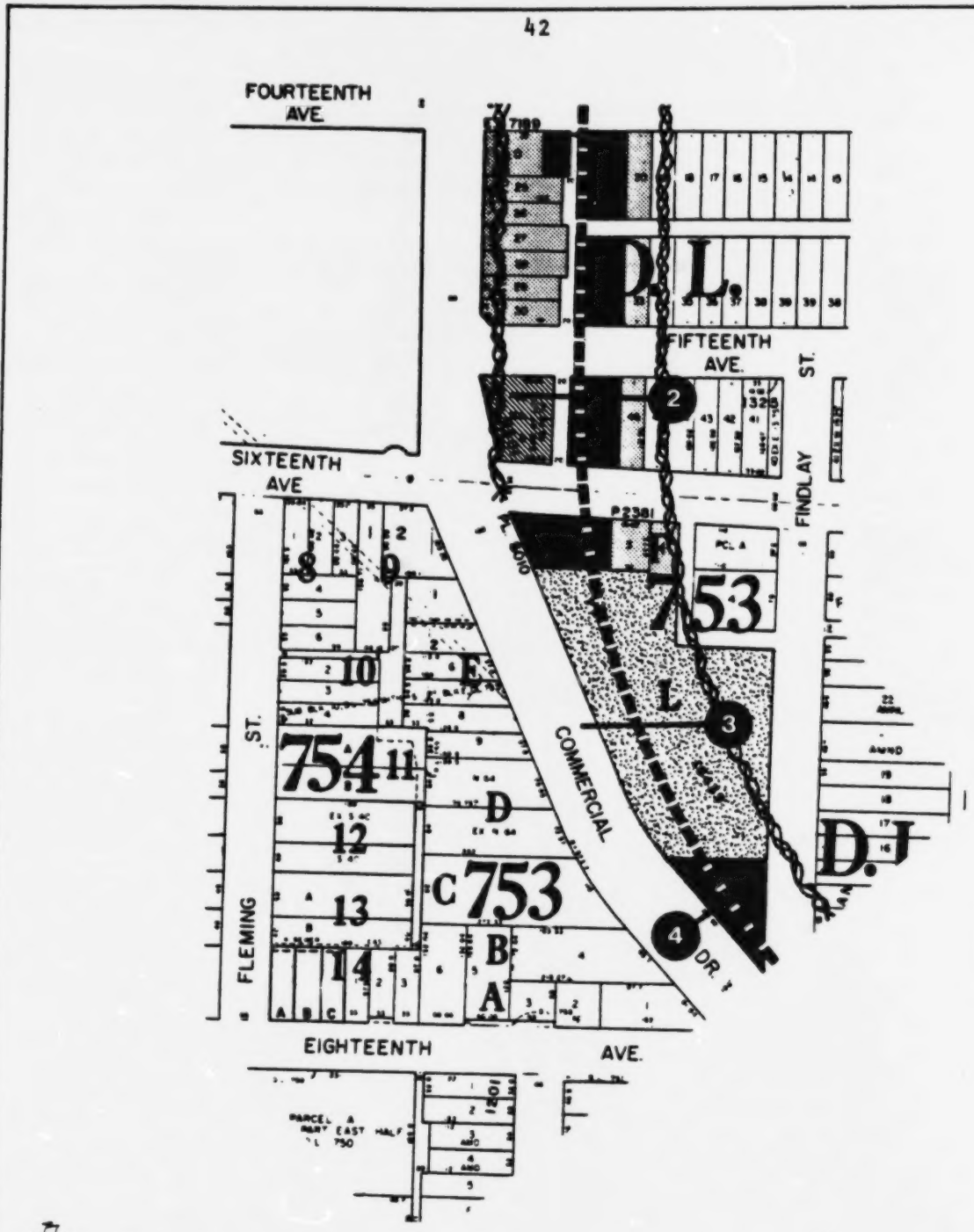
RECOMMENDED ACQUISITIONS
- B. C. Transit Committed to Purchase
- B. C. Transit Should Purchase
- B. C. Transit Should Purchase at Owner's Request
- B. C. Transit Agree to Provide Amelioration (e.g. Noise Attenuation, Landscaping)

OTHER SYMBOLS
- ALRT Structures (Stations, Substations)
- ALRT Track (Elevated)
- ALRT Track (at Grade)
- ALRT Track (Below Grade)
- City-Owned Land
- B. C. Hydro Rail
- Noise Contour (55 dB Level - 1986)
- 8 Sectional Reference (See Accompanying Drawings)

ALRT Alignment
Suburban Property Proposals

Date	July, 1983
Drawn	I.G.C.
Scale	1:2400

No. 2



City of Vancouver
Planning Department

Fig. 25

RECOMMENDED ACQUISITIONS
- B. C. Transit Committed to Purchase
- B. C. Transit Should Purchase
- B. C. Transit Should Purchase at Owner's Request
- B. C. Transit Agree to Provide Amelioration (e.g. Noise Attenuation, Landscaping)

OTHER SYMBOLS
- ALRT Structures (Stations, Substations)
- ALRT Track (Elevated)
- ALRT Track (at Grade)
- ALRT Track (Below Grade)
- City-Owned Land
- B. C. Hydro Rail
- Noise Contour (75 dB Level - 1986)
- 8 Sectional Reference (See Accompanying Drawings)

ALRT Alignment
Suburban Property Proposals

Date	July, 1983
Drawn	I. G. C.
Scale	1:2400

No. 3

c) B.C. Transit Should Purchase at Owner's Request - These properties will experience serious noise impacts and/or privacy impacts. Properties should be purchased at the owners' request. Properties could then be redeveloped or resold with a caveat placed on the title alerting future owners to the noise and/or privacy problem.

Twelve properties have been recommended for purchase at the owners' request east of the lane and six properties west of the lane. The properties on the third lot east of the lane will all be impacted by ALRT noise and will likely experience a loss of privacy from ALRT riders overlooking their backyards even if B.C. Transit redevelops the residual property it now holds which ultimately is not needed for ALRT construction. B.C. Transit currently has sufficient site area on their properties for redevelopment to duplex density. This would clearly not adequately handle the noise and visual impacts of ALRT. If the third lot was purchased, a denser scheme could be implemented, which would mitigate ALRT impacts and offset most of the costs of land acquisition.

The commercially zoned but residentially occupied properties between 14th and 15th Avenues west of the lane have similar ALRT impacts as the RT-2 properties west of the lane described above. However, their larger lot depth and C-2 zoning makes private sector assembly and redevelopment more likely. It is therefore recommended that B.C. Transit acquire the lots on a request to sell basis. All 18 properties have an estimated value of $1,700,000.00.

4. New Zoning and Land Use Provisions

Development regulation through appropriate zoning and urban design guidelines provides an effective means for replacing lost businesses and housing due to ALRT right-of-way and station requirements as well as controlling the form of intervening structures necessary to mitigate the noise problems adjacent to the guideway. Several such zoning and urban design suggestions discussed in this report should be subject to thorough discussion as part of the local area planning program.

Table 3 contains a summary of all short-term and long-term mitigation measures discussed in the report.

TABLE 3

ALRT - COMMERCIAL DRIVE EAST LANE
IMPACT MITIGATION MEASURES

Sub-Area	Short-term Measures	Long-Term Measures
1. N.E. TRIANGLE SITE	- alternate parking/loading for remaining easterly businesses. - provide pedestrian overpass of Broadway in 1986. - provide off-street bus loop.	- purchase of remaining business - comprehensive redevelopment of parcel to: a) replace lost outlets. b) establish retail continuity. c) adequately accommodate pedestrian and bus traffic. d) take advantage of proximity to the ALRT station.
2. BROADWAY TO 10th STATION SITE (East of Commercial Drive)	- replace lost parking and ensure adequate access through consolidation of existing lots. - integrate station design into commercial frontage. - fire exiting provisions for Safeway Store. - provide secondary station entrance on Commercial Drive.	- comprehensive redevelopments west of station.
3. 10th to 12th AVENUE (East of Commercial Drive) Commercial Area	- replace lost parking and provide new north-south lane to improve access.	
4. LANE SOUTH OF 10th to 16th AVENUES Residential Area East of Lane	- buy/sell back program for third house from lane	- erect intervening structure as a screen to ALRT noise. - minimum three lot. - maximum to be set by plan. - landscaping
5. 14th to 16th AVENUES Residential Area West of lane.	- buy/sell back program for residential properties except two lots south of 15th Avenue which should be purchased.	- determine alternate development form and uses through area plan.

ALRT Alignment
Suburban Property Proposals
Drawn
Scale 1:2400
No. 3

COST IMPLICATIONS FOR B.C. TRANSIT OF THE PROPOSED MITIGATION MEASURES

In this climate of restraint the costs of mitigation measures are an important consideration. All of the mitigation measures recommended for implementation by B. C. Transit are once only capital costs such as adding to existing station facilities and property acquisition. Many of the measures can be phased in over a period of time so that costs are not incurred in one budget year. B. C. Transit has already agreed to pay for some of the mitigation measures and others have been budgeted for as part of a compensation package for affected owners.

The most expensive mitigation measure initially is property acquisition but in the long-run the actual dollar spent could be quite small. In the buy/sell program for owners adversely impacted by ALRT, the estimated $2,300,000 cost based on assessed value, could be recovered through land sales or redevelopment. As prices will be based on pre-ALRT property values, any increased value due to the proximity of the site to the station would be captured by B. C. Transit.

The properties recommended for outright purchase have an estimated cost of $1,000,000 based on assessed value. In many cases these sites could be combined with other parcels for comprehensive redevelopment. The revenues generated through redevelopment would significantly reduce cost outlays and in some cases may exceed acquisition costs.

The City can assist B. C. Transit in minimizing the costs of mitigation measures by cooperating in joint development where there are nearby City-owned sites and by early adoption of clear Station Area plans.

CONCLUSIONS

Locating the ALRT alignment down the east lane of Commercial Drive presents a challenge to integrate the guideway into the adjacent residential area with minimum disruption. This is the major reason why Vancouver City Council favours a cut-and-cover tunnel configuration for ALRT in this vicinity. The recommendations contained in this report represent the first step in meeting that challenge if the east lane ALRT option is implemented. Many of these measures call for innovative planning and design solutions largely untried elsewhere. Some of these solutions can only be implemented if significant change takes place in the residential area.

Starting a dialogue between all the relevant actors including B. C. Transit, City of Vancouver and the community is a prerequisite to solving these problems. This paper should provide the focus for that discussion and serve as the basis for City staff review and comment. Ultimately this paper will be used as a background for specific reports to Vancouver City Council.

POOR

QUALITY

ORIGINAL